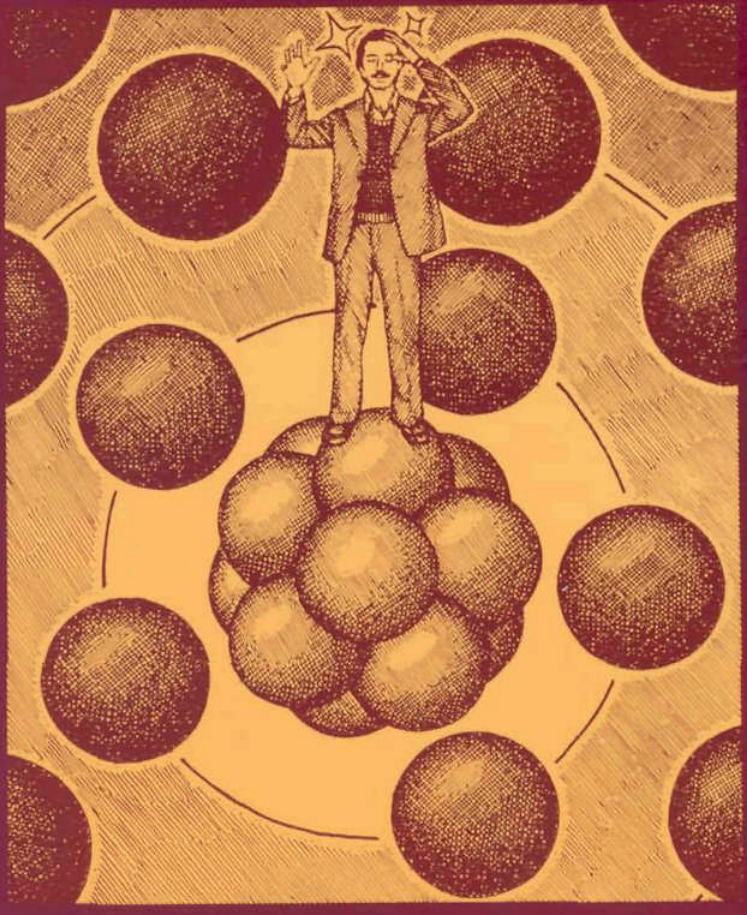
the Skeptical Inquirer

Quantum Theory and Psi: The Misuse of Science



Philosophy and Parascience: Two Views
Edges of Science / UFOlogy's Nonstandards
Identical Twins / Pseudoscientific Beliefs

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the Skeptical Inquirer

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News and Comment

Exploring the Edges of Science at the AAAS: Nonconfrontational Views and Encounters

"THE EDGES of Science" it was called, and the half-day symposium at the annual meeting of the American Association for the Advancement of Science (AAAS) in New York City over the long Memorial Day weekend was one of the best attended of the meeting's several hundred sessions.

It wasn't clear whether the crowd was attracted more by the relatively exotic subject or by the presence on the platform of stars like Isaac Asimov, Arthur C. Clarke (a surprise guest), and James Randi, not to mention (at a slightly different position on the belief spectrum) the irrepressible UFOlogist J. Allen Hynek.

In any event, the assorted hundreds heard a pretty good session, with something for nearly everyone, both in topic and approach.

Asimov led things off with an informal yet elegant introductory discussion. The edges of science are one thing, but what lies beyond the edges? He proposed an "unexplanation" criterion. It is easy to make up a theory that explains everything, noted Isaac. Anyone can do it. Theories are cheap. The trick is to propose a theory that explains a lot without *un*explaining too much. You might theorize that a downed tree was caused by the weight of an elephant who climbed and broke it. That would explain the broken tree. But you have now *un*explained many things already well explained by physics and physiology.

The theories of Velikovsky can explain the Bible, "but Velikovsky unexplains almost all of celestial mechanics and the conservation of energy. . . . The small amount of explanation does not balance the large amount of *un*explanation."

As for creationism, said Asimov, it is far beyond the edges. "It explains nothing and unexplains everything!"

In contrast, the edges of science are characterized more by such things as lack of evidence (scientists have yet to discover any signs of extraterrestrial intelligence, "but either way no serious unexplanation is involved") or an almost total reliance on anecdotal evidence (such as with UFOs), "where somehow you are always left with a story."

The edges can also shift. They can either move "into the mainstream" (meteorites or astronautics) or "fall off the edge" (the canals of Mars).

Asimov: Unexplanation criterion

Clarke, at the invitation of symposium chairman Rolf Sinclair, popped in on the AAAS meeting between completing the filming of his novel *2010* and beginning the filming of a new 13-part TV series, "Arthur C. Clarke's World of Strange Powers." He spoke mostly of UFOs. At one time, said Clarke, he took them seriously. "Now UFOs need a period of malign neglect." The problem with UFO sightings, he said, is the Lowell effect: "You see what you want to see." As for anecdotal reports of landings, "If there really is a landing, it can be documented in 30 minutes."

The whole UFO-sighting question, said Clarke, can benefit from the recent laboratory evidence that people can hallucinate so well that electrical activity in their brain agrees with their visions. Clarke also gave little comfort to government-conspiracy theorists and their claims of a coverup of crashed UFOs. If anyone thinks there's the slightest chance that such a discovery could be kept secret for even a week, let alone 30 or 40 years, said Arthur, "they don't know a damn thing about scientists."

Parapsychologist Stanley Krippner gave a plea that parapsychology, despite all its shortcomings, deserves to be properly investigated. He recounted some of the case studies, observations, and psychological analyses of people that have shown intriguing results and that "deserve to be studied further." He also urged his colleagues to adopt stringent controls, and he noted that last year the Parapsychological Association's governing council adopted a resolution welcoming collaboration with magicians regarding adequate controls against fraud (*SI*, Winter 1983-84, p. 102). Most of the best pro-psi observations had no magician present, "and this omission can be interpreted as a flaw in otherwise well-controlled procedures."

Psi studies, he emphasized, need to adhere to several basic standards of scientific method, such as published

Clarke: UFOs need malign neglect.

refereed reports, precise definitions, objective data collection, replicable findings, and cumulative and systematic approaches.

Krippner had some criticisms of the critics of parapsychology, but a recent critique by PA member Charles Akers (also a member of CSICOP's new Parapsychology Subcommittee) of experiments at Maimonides "serves as an example of comprehensive and constructive criticism by a parapsychologist which could well be emulated by those outside the field." (Akers found that 90 percent of the experiments he studied suffered from one or more of six flaws.)

"I think that parapsychologists should stress the speculative nature of many of our concepts, be candid about the controversial status of our field, and not make assertions which go beyond what is warranted by the evidence," concluded Krippner. But investigation should go on. "Whatever the eventual outcome of this search may be, it cannot help but add to the sum of knowledge about humanity and the human condition."

James Randi, not surprisingly, was less restrained in his analysis, if not in his delivery (like Krippner, he read a prepared paper). The question about claims of the paranormal, said Randi, is not whether they are theoretically possible but whether they are supported by objective examination of the evidence. "In short," asked Randi, "where's the beef? In my 35 years of posing that query, I have found a great deal of baloney, but precious little beef."

He criticized paranormalists for credulous acceptance of the "shyness effect" and "negative vibrations" rationalizations and for putting theory before evidence. He said his "mind boggles" at theoretical offerings from Helmut Schmidt and others of "retroactive PK," psychokinesis acting backward in time.

He also urged parapsychologists not to be too quick to go the high-tech route. Parapsychologists are rushing to apply computer-age techniques to their research. "Therein lies a distinct danger.

Too much reliance on a computer program easily leads to relaxation of control factors." Human subjects can still play havoc with laboratory materials, and with computers "a sterility ensues that is often wrongly taken as evidence of clean protocol. Involved instrumentation can be far less secure than a simplified design."

He again warned scientists not to assume their training prevents their deception. Common sense is sometimes better than the evidence of the senses: "Does the conjurer *really* pull a rabbit from an empty hat?"

Randi had numerous criticisms for the recent claims of poltergeist happenings in a home in Columbus, Ohio. The photographer of the now-famous flying-phone photo, said Randi, "admitted that he had—in accordance with instructions from the girl—purposely looked away from her when taking the photos, pressing the shutter only when instructed to do so." The photo contact sheets show clear evidence of deception, revealed Randi, including one (unused) frame of the teenage girl pulling the sofa with her foot.

Randi emphasized that the majority of parapsychologists are dedicated and competent, and he expressed respect for them. "But my basic premise, I think, cannot be denied. Parapsychologists have proven time and again that they are prone to find the results they expect, rather than what is dictated by the evidence and by common sense. They share that weakness with any field you care to mention."

The UFO question was argued by Hynek and CSICOP Fellow and space-engineer/author James Oberg. Hynek gave his usual argument that there are just too many unexplained UFO reports to say there isn't something unusual going on. "Computer analysis of 400 UFO cases," he told the audience, has demonstrated that many of the reported properties of UFOs "are totally inconsistent with those of everyday objects and phenomena." He criticized those who argue that "independent witnesses could be so grossly misled as to imagine simultaneously, for example, that a meteor could stop, hover, and then

Clever Hans and Young Scientists

ALSO SPEAKING at the AAAS, in an earlier session, was CSICOP Fellow and Indiana University semiotician Thomas A. Sebeok, who just completed a year as Regent's Fellow at the Smithsonian Institution. Sebeok addressed a session on "The Process of Becoming a Scientist," which included as speakers and listeners a number of bright high-school science students who have done original research.

Sebeok entertainingly recounted the story of Clever Hans—a horse considered for a time to be capable of doing mathematical calculations—as a case study of deception and self-deception in science. Another investigator eventually showed that the horse was getting unconscious cues from his trainer.

Sebeok outlined similar examples in science and urged scientists-in-the-making to be cautious in conducting experiments and evaluating results. They need to be aware of the influence of their own hopes, wishes, and imperfect perceptions, he said. "Self-deception is almost unavoidable. It is a part of human nature. But precautions can be taken to minimize the damage."

—*K.F.*

Hynek: Inconsistent with the known.

Oberg: The residue fallacy.

reverse direction."

Oberg then proceeded to give abundant examples of documented cases where just that very thing has happened. In particular, dramatic UFO sightings in the Soviet Union and South America, shown by Oberg to be due to nighttime rocket launchings in the USSR, and rocket-staging sequences over Argentina (*SI*, Fall 1982, Fall-Winter 1977) resulted in anecdotal reports of just the kind Hynek mentioned. The objects were said to go in different directions, stop and start, cause cars to stall, chase cars, and even attack people. And we now know precisely the stimuli that caused these reports and that the objects, visually dramatic as they were, did no such thing. Human expectations, imaginations, and fears interact with and become part of the observation process, and it is too much to expect that it will ever be otherwise.

Oberg chided Hynek, at least indirectly, for failing to recognize the foibles of human perception and for

Randi: Baloney not beef.

Krippner: Continue psi studies.

Thoughts about 'Edges': A Comment from the Session Chairman

THE REST of the AAAS meeting dealt with what is unquestionably science. It seemed appropriate in one session to take a look at the "edge" of science—those areas that some scientists work in, yet where there is clear disagreement about: (1) whether there are natural phenomena to be investigated, and (2) whether the tools of the natural sciences can be used appropriately. We excluded topics that are beyond the edge and by scientific standards are not even wrong (such as phrenology, "creation science," classical astrology, and the theses of Velikovsky), and similarly excluded technical arguments within science (such as the existence of black holes). In arranging this session we considered many possible topics, and finally focused on three that are representative of different aspects of the "edge": the existence of paranormal phenomena involving the human mind in yet-unexplained modes, the value of searches today for extraterrestrial intelligence, and the existence of UFOs.

The talks were paired, two to each topic. There was no debate, and no confrontation: nobody "won." The speakers respected each other's viewpoint, but found there could be honest disagreement between well-intentioned people. This proved to be an effective way to treat such subjects. There were no real "conclusions," nor was there intended to be. The talks were not diametrically opposed, but they did show—as expected—sharp differences of opinion.

One thing should be clear—the AAAS doesn't "endorse" anything that happens to be presented in a talk at its meetings. (The only endorsements are resolutions of the AAAS Council.) The Association simply provides a framework—through its meetings and publications—within which scientists can interact, exchange views, argue, agree, disagree, or ignore. The science so formed evolves with time; the framework stays the same. So presenting talks on UFOs doesn't establish any "AAAS position." There are several hundred sessions at each meeting; each is the responsibility of the arranger, and I take responsibility for the one in question. Address comments to me, not the Association! In short: science is what scientists do and talk about.

Science changes. Stuff at the edge can become part of the mainstream as we learn how to ask the right questions (ball lightning, meteorites, Cantor sets, circadian rhythms, to name a few); other stuff goes away (phlogiston, caloric, Vulcan, N-rays) as we find them sterile or mistaken points of view. A session on the edges of science would include quite different topics every few decades!

I am grateful to the speakers for giving their time and effort to make such interesting presentations. Professors Krippner and Hynek are particularly to be praised for being "Daniels in the Lion's Den" and talking in the face of fairly general skepticism. That is the price the innovator always pays, whether he be right or wrong.

—Rolf M. Sinclair
Secretary, AAAS Section B (Physics)

refusing to learn from the lessons of such IFOs, *identified* flying objects.

"No extraordinary phenomena are required to explain UFO reports," contended Oberg.

Responding to a barbed criticism from Hynek that Oberg had written in a recent article that pilots are poor observers of UFOs, Oberg said they indeed are, and elaborated. Pilots are trained to take immediate action to avoid any perceived hazard. They therefore quite properly err on the side of caution when they see a momentarily startling object, such as a meteor, seemingly flashing through the sky in front of them even though it may be a hundred miles away. They are not in a position to make careful observations under such circumstances, nor are they trained to. Oberg gave several examples of airline pilots making outlandishly inaccurate reports about IFOs.

Oberg pointed to what he called "the residue fallacy." There will be a normal residue of unsolved cases no matter what, Oberg said. He proposed a thought experiment: assume for the moment that the roughly 10 percent of unsolved cases—claimed by UFO enthusiasts to be "true" UFOs—go away for a while, leaving only the UFO reports caused by misperceptions, pranks, and hoaxes. It would still be unreasonable to expect investigators to be able to solve all such prosaic cases—there is often just not enough reliable available information. This residue of "false" UFO cases would still be indistinguishable from what pro-UFO investigators present as true UFOs. The implication is that there are no true UFOs (see Oberg's discussion of this in the May 1984 *Omni*).

Finally, said Oberg, the whole UFO question is exacerbated by one fact: "Many UFO groups are financed by UFO enthusiasts who do not want solutions." Their goal is to keep the UFO "mystery" alive.

The session continued, with papers by scientists Frank Drake and Eric Jones debating opposite sides of the utility of the scientific search for extraterrestrial intelligence, well into the noon hour. Questions from the audience went on for some time after that. Everyone got to have their say. Given the controversial nature of some of the topics under discussion and the presence in the audience of a few world-class cranks, there were remarkably (disappointingly?) few fireworks. Some people seemed to believe that the session was serving to give official AAAS credence to fringe-science topics, but there is no truth to that (see box). The symposium was billed as an exploration of the edges of science (see *SI*, Winter 1983-84) and a chance to air some issues—not as a confrontation. It served that goal well.

—*Kendrick Frazier*

Collective-Meditation Claims: Case Study in Challenging

APPEARING ON ABC-TV's Portland, Oregon, affiliate, KATU-TV, a Mr. Robert Cox cited the "scientific technology" of Transcendental Meditation as offered through Maharishi International University.

As a guest on the local "A.M. Northwest" program, Mr. Cox claimed that through collective meditation of one-tenth of one percent of the world population (or "the square root of 1%," as he selected to enunciate), one would observe declines in crime rates, hospital admissions, and traffic fatalities. Further, according to this longtime teacher of TM, one could expect improvements in the world stock market and a subsequent easing of world tensions. The same claims are being made

in widespread newspaper and magazine ads and in promotional mass mailings.

Fortunately, one of the "A.M. Northwest" hosts, Margie Boule, has chosen to examine such claims. She called Northwest Skeptics, and we provided her some background information on MIU and TM claims.

Mentioning a global experiment done in December 1983 in Fairfield, Iowa, Cox said such a demonstration showed the "principle of how this technology—the unified field—can actually enliven all the laws of nature in the environment." Commenting that all the different forces and particles in nature can be understood through one fundamental field, Cox said that "the unified field is a scientific term."

Co-host Boule played the skeptic by stating, "I hear you using the term *scientific* over and over again, and yet every time a scientific body has tried to investigate TM—the claims of levitation, for example—the science group has been refused. How can you call it scientific when there has never been any true scientific study done? Scientists have never been allowed to go in and observe the levitation, for example. Why is that?"

Rambling a bit, Cox mentioned TM studies at Harvard Medical School, Stanford, and UCLA, but agreed that "we haven't necessarily opened up to the press for observance because it would bring the whole thing down to a circus level."

Interviewer Boule then read a statement published in the SKEPTICAL INQUIRER in which John R. Cole, an anthropologist then at the University of Massachusetts, stated that during the summer of 1979, "before expenses, 3-5 million dollars was reaped by the TM people." "If you're going to do good," she asked Cox, "why can't you teach people how to do these things for free?"

Somewhat sheepishly, Cox replied that "everything costs money. And the TM organization is a nonprofit educational organization. And our goal is to create a state of world peace . . . The United States is a very wealthy country and the TM organization is by no means a wealthy organization."

He mentioned meetings within the state of Oregon with "government officials" to present them with TM technology—a claim flatly denied by a spokesman for the Oregon governor's office. Indeed, the governor's office had indicated to Northwest Skeptics three weeks *prior* to the program that they had immediately turned down any connection with the Maharishi group.

Cox stressed that TM "allows the mind to experience more and more refined states of the thinking process and develop full mental potential." But at what cost? As co-host Jim Bosley mentioned in closing, "It's about $400 now—and that's the beginning. You want to get into levitation and that's something else again—that's not cheap!"

This case shows that a well-prepared host, armed through the aid of informed skeptics with some facts and critical perspectives, can change what would otherwise be a self-serving

pro-pseudoscience interview into a segment that serves the public interest.

—*John Merrell*

John Merrell is Oregon–Idaho coordinator for the Northwest Skeptics.

New Biology Texts for Texas Contain Material on Evolution

WHEN THE PUBLISHERS submitted high school biology textbooks in late April for subsequent selection in Texas, their content was surprisingly not as watered-down on evolution as expected.

According to a brief survey John Hauser and I made of ten Biology I textbooks, all had at least one chapter on evolution, and two of them had three. The number of pages on evolution in their indexes ranged from 12 to 40. Of three Biology II texts, one had four chapters on evolution and another had five. The number of pages on evolution in their indexes ranged from 10 to 70.

This rather pleasant ending to the whole series of events in the Texas textbook controversy (see *SI*, Summer 1984) indicated that the publishers had proceeded before the repeal of the Texas rule as if having acceptable texts for other states outweighed catering to Texas's requirements. What effect the national negative publicity directed to Texas education and its State Board had on the publishers' actions was not apparent.

Thus it appears that Texas students will have biology textbooks with at least some evolutionary material after all, thanks to the efforts of those within and without the state who are genuinely concerned about quality science-education. The Texas experience demonstrates that, as unfortunate as it may seem, such concern must be prepared to grapple with subtle, provincial, and highly sectarian political power.

—*Ronnie J. Hastings*

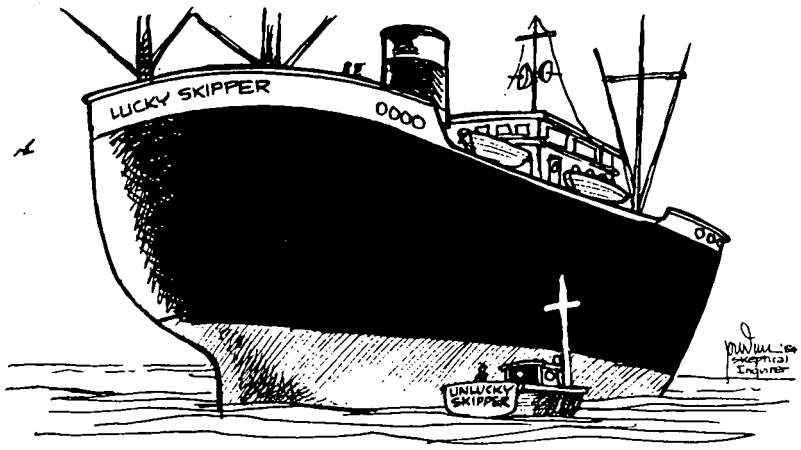
Dr. Hastings is a science teacher in Waxahachie, Texas, active in fighting creationist influences in textbooks.

'Skipper Effect' Myth Debunked as Too Fishy

DO DREAMS or hunches make you a superior fisherman? Paul Durrenberger, professor of anthropology at the State University of Iowa (Iowa City), studied this Icelandic myth in the summer of 1981 with Gisli Palsson, an anthropologist at the University of Iceland.

Iceland's heroes are the fishing boat skippers, the most successful of whom are revered as rock stars are elsewhere. Durrenberger sought to find out if there was indeed a "skipper effect" based upon ability to successfully choose fishing sites suggested in superior dreams. In a country where 91 percent of the citizenry believe in the power of dreams (according to one survey), fishing-boat skippers enjoy a cultural "given" that tends to honor their claims. How to demonstrate that there is no such effect and to counter the many scholarly papers already written to support the skipper effect? An article in the University of Iowa *Spectator* (March 1984) describes the research effort.

Fortunately, incredibly detailed records of fish catches have been maintained in Iceland for many years. Durrenberger's computer analysis of these records showed that two mundane factors accounted for 90 percent of a skipper's success: "how big his boat was and how often he took it out to fish." The remaining 10 percent could be



attributed to such elements as the weather and random events of the sea as well as any skipper effect.

When the two anthropologists presented their conclusions at a summer international Congress of Nordic Sociologists (some of whom had been authors of papers on the skipper effect), they were told that because their study dealt only with data on cod, which are easy to catch, there must still be a skipper effect associated with herring fishing.

After two to three more hours at the computer, Durrenberger could find no support for that claim either. Skill was eliminated as a critical variable because all skippers attend the same maritime academy and serve a period of training as mates before becoming captains of their own boats.

Why do so many believe in the skipper effect? The skipper gains by self-promoting the myth of his superior "fishiness" because he can get better loans to buy bigger boats, go out more often, and acquire better crews. The myth persists among the people because it " 'resonates' well with other Icelandic cultural concepts of luck, daring, individualism, and the hero."

An interesting sidelight is that the skippers who exhibit most fishiness eat what Icelanders regard as a mark of affluence—steak.

—Lee Garner

Lee Garner is a writer and technical editor in Albuquerque, N.M.

Bart Bok Memorial Fund Established by ASP

A FUND TO CARRY on the work of astronomer Bart J. Bok (*SI*, Winter 1983-84) in sharing the excitement of modern astronomy with the public has been established by the nonprofit Astronomical Society of the Pacific.

Seed grants totaling $23,000 have already been received from the Perkin Fund and from several of Bok's students and colleagues. The Society is hoping to raise an endowment of at least $100,000 to support a variety of programs in public education.

These would include a Bart J. Bok Memorial Lecture Series, in which eminent research scientists would give nontechnical talks to large public audiences;

workshops on astronomy for schoolteachers in grades K-12; and support for the Bart and Priscilla Bok Awards for high school astronomy projects.

All gifts to the fund are tax deductible; acknowledgments will be sent both to the donor and to Bart Bok's children. Checks should be made payable to "ASP/Bart Bok Fund" and sent to the Society offices at 1290 24th Avenue, San Francisco, CA 94122 (U.S.A.).

The Media and UFOs

THE DYNAMICS of media presentation of pro-fringe viewpoints were evident in United Press International's stories on the AAAS "Edges of Science" symposium May 29 in New York City (see p. 2). Two different UPI stories were distributed nationally and printed in daily newspapers the next day, but each dealt entirely, or almost entirely, with the pro-UFO presentation of J. Allen Hynek. "UFOs Exist, Specialist Says," was the headline in one newspaper. That article, as printed, devoted all 12 paragraphs to Hynek. There was no mention of any alternative view, nor of the three other speakers in the symposium who had entirely negative things to say about UFOs; James E. Oberg, Arthur C. Clarke, and Isaac Asimov. The other version of the UPI story devoted 10 paragraphs (the first 10) to Hynek's statements, and three one-sentence paragraphs at the end to Clarke's and Oberg's.

The morning of the symposium, Hynek appeared in a nationally televised, live, in-studio interview on ABC-TV's "Good Morning America," again giving his pro-UFO views. Oberg, known for his critical analyses of UFO reports, was not invited.

—*K. F.*

New York, Minnesota Groups Form

A NEW YORK area skeptics group is in the process of formation; the first organizational meeting was held in July. We will carry details in a future issue. For further information contact Andrew Skolnick at 914-428-7100 (office) or 212-877-2286 (home) or Dr. Terence Hines, Psychology Department, Pace University, Pleasantville, NY 10570.

A group in Minnesota is hoping to form a local organization with aims similar to CSICOP's. For further information contact Robert W. McCoy, 549 Turnpike Road, Golden Valley, MN 55416.

Skeptical Inquirer Gets a Boost

AN ANONYMOUS donor has given CSICOP $4,000 to be used for subscriptions to the SKEPTICAL INQUIRER for public and college libraries in California. The gift of this generous benefactor will fund 245 one-year subscriptions for public, junior college, and four-year college libraries.

— *Andrea Szalanski*

In Brief

THE 1984 American Institute of Physics-U.S. Steel Foundation Science Writing Award in Physics and Astronomy went to an article critiquing perpetual motion. The article, "Perpetual Commotion" by John Tierney (see listing in *SI*, Fall 1983, p. 86), appeared in the May issue of *Science 83*.

—*K. F.*

MARTIN GARDNER

Notes of a Psi-Watcher

Koestler Money Down the Psi-Drain?

IN MARCH 1983, after a long, dramatic career, Arthur Koestler ended his life dramatically by killing himself. He and his wife, Cynthia, were found dead in their home near London, both having taken overdoses of barbiturates. The Hungarian-born writer, age 77, had been suffering from terminal leukemia. His wife, in her fifties, was not ill. A suicide note expressed Koestler's "timid hopes for a depersonalized afterlife beyond due confines of space, time, and matter, and beyond the limits of our comprehension."

Koestler's intellectual pilgrimage falls into three parts: (1) active communist, (2) active anti-communist and author of the influential anti-Stalinist novel *Darkness at Noon,* which made him famous, and (3) active promoter of the paranormal. Koestler was firmly convinced that parapsychology is ushering in a new Copernican Revolution.

The Koestlers left a will in which about $750,000 was set aside for the endowment of a chair of parapsychology at a United Kingdom university. Oxford, Cambridge, and other leading universities declined the endowment on the grounds that it would cast doubt on their other research programs. Only two finally sought the funding: the University of Wales, at Cardiff, and the University of Edinburgh. Koestler's trustees finally gave it to Edinburgh. Earlier, retired businessman Instone Bloomfield, a friend of Koestler, had independently established a Koestler Foundation. He announced that he would increase Koestler's endowment by another $750,000 if the chairman of the new department planned a research program that his foundation approved.

At the time of this writing, the chairman has not yet been chosen. However, a psychologist at Edinburgh and one of the leading figures in British parapsychology, John Beloff, was a good friend of Koestler. Beloff's *New Directions in Parapsychology* (1974) has a postcript by Koestler. Although Beloff is noted for the negative results of his experiments, especially when he tried to replicate U.S. tests of psi, he is a firm believer in the paranormal, including the psi powers of the great mediums of the past, and in the powers of modern psychics like Uri Geller and Ted Serios.

Beloff has always been enormously impressed by the fact that the Scottish medium D. D. Home was never caught cheating, but he is not in the least dismayed that other famous mediums, such as Eusapia Palladino, were often caught in deception. In an article in *Encounter* (January 1980), he wrote: "Everyone knew that she [Palladino] would cheat if given half a chance to do so; but skeptics prefer to forget that the effects

she could achieve in this way were quite feeble and that her most spectacular seances were conducted under the most stringent conditions. . . ." In our own time, he continues, we have Uri Geller, now generally considered a mere entertainer. "He, too, is probably a mixture of the genuine and fraudulent." This view of Uri was shared by Koestler. Koestler was described as "visibly shaken" when he once saw Uri produce bursts in a Geiger counter, though he conceded later that Geller also at times resorted to trickery.

In 1975, Beloff reviewed three books about Geller: Geller's autobiography, Andrija Puharich's biography, and John Taylor's *Superminds,* in which Uri is the hero. Beloff opens this lengthy review (*Journal of Parapsychology,* September 1975, pp. 242-50) by deploring the tendency of his colleagues to turn away from Uri because of his money-grubbing show-biz background. "This attitude, though understandable, is, I am convinced, profoundly misguided. It is just possible that Geller may prove to be the most gifted all-round psychic subject that there has ever been, not excluding D. D. Home!"

"The Geller case," he continues, "has long since passed the point where it is sensible to doubt that Geller possesses paranormal powers. . . ." To support this, Beloff cites Uri's die test at the Stanford Research Institute (now SRI International), which he considers impossible to explain by deception. (This was written before information about the die test leaked out proving it to have been almost totally uncontrolled. See my *Science: Good, Bad, and Bogus,* pp. 106-08, and "How Not to Test a Psychic: The Great SRI Die Mystery," in SKEPTICAL INQUIRER, Winter 1982-83, pp. 33-39.)

Beloff regards Uri's ESP and PK powers as so "indisputable" that he considers it a "waste of time" to debate their "basic authenticity." The most indisputable, he argues, are those feats that Geller performs on order: fork-bending, starting stopped watches, and clairvoyance. His less predictable miracles, such as dematerializations and teleportations, "so familiar to those who have had the good fortune to work closely with Geller," are not quite so indisputable. Geller just *might* have used trickery.

In the review, Beloff considers the notorious incident in 1973 when Geller, as he himself described it, was bodily teleported from the east side of Manhattan to Puharich's house thirty miles away in Ossining. Beloff concedes that Geller *could* have been playing a joke, but he adds: "I ask these questions because I want to emphasize that, where Geller is concerned, nothing should be allowed to go by default and nothing is too fantastic to be worth probing." Earlier cases in which powerful mediums were similarly teleported are cited. The tales may sound like the *Arabian Nights,* he admits, but "the word *impossible* does not belong in the vocabulary of parapsychology."

"Some people," Beloff goes on, find Uri "exasperating, but many more quickly succumb to his boyish charm and striking good looks. But what should make him of interest to readers of this journal is that his life, by all accounts, has been one prolonged poltergeist episode with amazing things happening at every turn. While, in the usual case, the poltergeist focus loses his [*sic*] powers in childhood, in Geller's case they appear to go from strength to strength as he gets older. He may well have reached the peak of his powers and, if we neglect him now, posterity may not lightly forgive us. The fact that he lacks the docile temperament to make a good experimental subject should not deter us. Great psychics, like

great geniuses in any field, are so rare and so precious we have to learn to accept them as we find them."

Puharich's crazy book, *Uri*, is criticized by Beloff on the grounds that Puharich was blind to the possibility that the tapes made by Geller, on which voices from UFOs were heard (before the cassettes mysteriously dematerialized or were erased), were not (as Puharich claimed) from extraterrestrials who were pumping psi power into Uri. More likely they were recordings made by Uri's PK. A photograph in Puharich's book purports to show three flying saucers. Beloff is of the opinion that this was a "typical Serios effect." He is here referring to Ted Serios, the Chicago bellhop who claimed the ability to project his thought pictures onto Polaroid film. Beloff has written elsewhere about Serios, who he thinks was a powerful psychic.

John Taylor is praised for his pioneer work with children who bend metal, and congratulated on having the privilege of being among the first to "witness some authentic bending phenomena with these subjects, whose powers usually seem to desert them when they are placed in a controlled situation." It never occurs to Beloff that this may be because the children previously cheated. Taylor, by the way, later repudiated his ridiculous book and concluded that Geller is a fraud and that paranormal metal-bending does not exist.

By 1981, when Beloff addressed the 24th Annual Convention of the Parapsychological Association, in Syracuse, he had become more skeptical of Geller, though not of the "Geller-effect." He expressed his continued belief in its reality and said it had been strongly confirmed by the metal-bending of the French magician-turned-psychic Jean-Pierre Girard. "Indeed," declared Beloff,

"the tests carried out by Crussard on the French metal-bender Girard were about as conclusive as one could well imagine . . ." (For details on these amateurishly designed tests see Randi's book *Flim-Flam!*) It does not bother Beloff in the least that Girard, like Geller, was once a stage magician or that the metallurgist Charles Crussard is as naive and ignorant of conjuring methods as himself. "If the effect is a real one . . . ," Beloff said, in the most sensible remark of his address, "it ought not be beyond the wit of man to prove it."

Here is how Beloff ended his rhapsodic 1975 review:

> After reading these three volumes it occurs to me that what we need even more than another good experimental investigation of Geller is a really reliable, detailed, and documented biography. And this work should be started as soon as possible while those connected with Geller are still available for questioning. If any wealthy benefactors would care to finance such an enterprise, they may be assured that parapsychology would be permanently in their debt.

At the time I write, the question of whether Beloff will be in a position to carry out this great project remains in doubt. He has stated that he has no desire to chair the new department, but even if he is not appointed his input into how the funds will be used will be formidable. An objective biography of Uri would be of great interest. It is just possible we might learn how he managed to fly from Manhattan to Ossining, or how he was able to teleport Wellington, Puharich's dog, through the walls of Puharich's house.

There are hopeful signs that Beloff may be entertaining serious doubts about some of the phenomena he considered unassailable a few years ago. His office recently issued an official report of his investigation of a self-styled psychic identified only by the pseudonym of "Tim." At Beloff's request, Randi supplied detailed protocols by which Tim could be caught cheating, and Beloff—with considerable misgivings, which are expressed in his report—did adopt Randi's simple procedures. The young man was caught blatantly cheating.

If the University of Edinburgh is capable of making sure that research conducted by the new department is in the hands of persons who know the meaning of "stringent controls" and who have the wisdom and courage to seek the help of the only experts on deception, the magicians, then perhaps the Koestler fortune will not flow down the usual psi drain. •

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ROBERT SHEAFFER

Psychic Vibrations

A FRENZIED attempt to "save the appearances" is evident in the May 1984 article in *Fate* magazine titled "Cayce Revisited." Written by Gina Cerminara, author of *Many Mansions*, a widely read book about the reputed psychic Edgar Cayce, the article (excerpted from a new book) suggests that "what Cayce said about caffeine and nicotine and what he did not say about sugar suggest urgent need for reevaluation."

The problem is this. Many of Cayce's followers are health faddists, and a lot of Cayce's pronouncements on health don't square up with the fads of today. For example, Cayce often told his followers that "coffee is a food." However, there are now reasons to believe that regular use of products containing caffeine may be dangerous, according to the author. (Cerminara, who is swept up in today's "holistic health" craze, is clearly more worried about moderate caffeine use than are most doctors.) But, if Cayce's "psychic" advice on coffee is not to be trusted, perhaps his other pronouncements were similarly fallible? The faithful need not fear. Cerminara explains how "it may be that because of the way coffee is being grown today, with worldwide pollutants in the air including insecticides, sprays and chemical fertilizers," the coffee beans themselves may be rendered unhealthy. Or, worse yet, because today your coffee might be made with "polluted, fluoridated, or otherwise chemically treated water," you may be harmed by the water, and not by the coffee itself. Thus, she suggests, one should interpret Cayce's teachings to mean "coffee was a food at one time," even if it is practically a poison today.

A worse difficulty is encountered with Cayce's frequent advice that not only is moderate tobacco use harmless but that "smoking in moderation to most bodies is helpful." Practically everyone today, and not just the health faddists, knows how wrong this is. Yet how could a great psychic have been so misguided? The situation is much the same as it is with coffee: "at the time Cayce was giving readings tobacco was produced in a simpler, more natural way." Cayce seemed to be aware of the necessity, says she, of smoking unprocessed tobacco, and today "arsenic and lead sprays are widely used on tobacco plants to repel insects," not to mention the "cancer-producing" or at least "highly suspicious" substances added to cigarettes to make up for the flavor they lose in removing much of the tar." So presumably the only reason not to smoke cigarettes is that you can't get any today that have been organically grown.

Perhaps Cayce's greatest sin of omission was in failing to warn us about sugar. The "case against sugar" is said to be "well documented and so

shocking," with "mountains of evidence" existing to show that sugar causes many degenerative diseases, such as cancer, polio, and arthritis. Since the doubting reader's own physician is almost certain to disagree with this statement, for proof we are referred to William Dufty's "magnificently researched and readable book *Sugar Blues*," a book that recommends the study of astrology as a vital parallel discipline to the science of nutrition. Perhaps Cayce failed to warn us about sugar, Cerminara suggests, simply because people were not eating as much of it 50 years ago as they are today. Another shocking health risk Cayce failed to warn us about is drinking water. In fact, Cayce recommended that people drink eight glasses of water a day. Today, of course, health faddists realize that the water coming out of our tap is "downright dangerous" due to "excessive chemical treatment of our water supply." But once again it appears that Cayce's advice was given specifically for his time and not for ours (even though Cayce's followers were far more likely to contract diseases from the untreated water in the rural south back then than one is by drinking today's "polluted" tap water). Of course, the skeptic may want to ask, if Cayce was so psychic, why didn't he foresee these problems and warn against them?

* * * * *

As the 1984 election draws near, some readers may be wondering what the prescient Jeane Dixon foresees as the outcome. Appearing on the TV Show "A.M. San Francisco" on April 11, 1984, she shared the following predictions: Walter Mondale will become the Democratic candidate, "unless the people change their thoughts." Who will win the election? "Peeking at the thoughts of people," Dixon sees Ronald Reagan being re-elected, "unless they change an awful lot, and switch at the last moment." These are predictions, she emphasized, and not prophecies, which means that they will come to pass—unless they don't.

* * * * *

The latest major contribution to cryptozoology is the new book by veteran UFOlogist and Fortean researcher John Keel, *Strange Mutants*. An ad in the Spring 1984 issue of *UFO Review* asks: "Has our nuclear technology unleashed . . . the beast of revelations? Strange mutants—not for the weak hearted!" The ad recounts sightings of "Mothman" (already well known to students of UFOlogy), "Ape Man," "Slime Man," the 20-foot "Penguin," the "Grinning Man," and "The Booger." Even more interesting, a centaur—half-man, half-horse—was sighted by a witness in Illinois, and "police could not prove [he] was lying." "Where were all these odd critters coming from?" asks the ad. "And where did they go? According to globe-trotting journalist John A. Keel, there is compelling evidence that some of them were short-lived mutants created by genetic acci-

dents caused by the radioactivity from all those atom bombs. Pitiful, misshapen creatures poisoned by man's stupidity even before they were born and doomed to lead short, disoriented lives blundering around our forests."

In an interview in the same issue, Keel explained further: "Few people realize that over 2,000 atom bombs have been set off in the earth's atmosphere. The radioactive fallout has been horrendous . . . Then there's those miserable atomic power plants. They are a terrible danger, too." Keel then cites the book *We Almost Lost Detroit* by John G. Fuller, the well-known authority on UFOs (e.g., *Incident at Exeter* and *The Interrupted Journey*), ghosts (e.g., *The Ghost of Flight 401*), and the like. "What [Fuller] skimmed over was the fact that tall, hairy monsters were seen in the immediate vicinity of the Enrico Fermi Plant in Michigan just before it went blooey! Monsters have an uncanny habit of showing up around all these plants. It is quite possible, even probable, that many of the critters I have investigated and written about are, indeed, mutants—weird mutations of more ordinary animals produced by the radioactivity."

Another "secret" Keel shares with the readers of *UFO Review* is: "Venus doesn't really exist. There never was a planet Venus. The astronomers made it up—just [as] they make up things like Black Holes . . . Fort suggested that all the stars are actually hanging from strings on a velvet backdrop. He was probably just as accurate as the guys who dreamed up the Black Hole."

The interviewer congratulates Keel for being a pioneer in observing the close tie-in between UFOs and psychic phenomena, about which, today, "people like Dr. Berthold Schwartz, the famous psychiatrist, Dr. Jacques Vallee, and even Dr. J. Allen Hynek seem to have jumped onto your bandwagon." Yes, Keel agrees, "for years people like Hynek and Vallee fought my concepts." "So," observes the interviewer, "you've triumphed in the end." For some reason, there still seem to be a few people who think that Keel actually takes this stuff seriously!

* * * * *

Inner Light, a publication put out by the same folks who delight us with *UFO Review* (above), asks, "Will the Spirit of Your Favorite Pet Survive Death? Is There an Afterlife for Your Beloved Dog, Cat, or Canary? Is There an Animal Heaven?" There certainly is and, to substantiate this, first-hand accounts are given by credible persons testifying to such things as: "My pet barked from beyond the grave"; "the cat who returned from the dead"; "Albert Payson Terhune's phantom dog"; and "the invisible cat." Mean-

while, the *National Enquirer* has been offering $100 for stories showing your pet has "uncanny psychic powers." Not to be outdone, its competitor, the *National Examiner*, proclaims "Millions of cuddly household pets are really space aliens," according to "a top psychophysicist." One Dr. Radj Potel of Calcutta, India, insists that one in five of our dogs and cats are descended from alien animals who first came to earth more than 50,000 years ago, when space beings first came to earth from the Pleaides. If your pet has psychic powers, can understand you instinctively, has an almost human personality, or is obsessively devoted to you, it is probably a Star Pet, says Dr. Potel.

* * * * *

According to the Belgian UFO publication *SVL Journal*, the widely publicized 1979 "UFO abduction" in France of Frank Fontaine has finally been admitted as a hoax. In the town of Cergy-Pontoise, not far from Paris, three young men—Fontaine and his friends Jean-Pierre Prevost and Salomon N'Daye—claimed a "close encounter," during which Fontaine was allegedly kidnapped by extraterrestrials and held for a week. The Belgian account, reprinted in the *MUFON UFO Journal*, quotes Prevost as admitting that "the Cergy affair was a hoax from the beginning to the end . . . I organized and put together the whole story." Fontaine spent the time of his "disappearance" hiding out in the apartment of a friend. •

CSICOP Conference

Paranormal Beliefs: Scientific Facts and Fiction

Friday and Saturday, November 9 and 10, 1984
Stanford University, Stanford, California

PROGRAM

Friday, November 9, 1984
Opening Reception 6:30 P.M.
Banquet 7:30 P.M.
Hyatt Rickeys Hotel

Introductory Remarks: **Paul Kurtz**, CSICOP Chairman and Professor of Philosophy, SUNY at Buffalo

Keynote Address: *Reason, Science, and Myths:* **Sidney Hook**, Fellow, Hoover Institution on War and Peace, and Professor Emeritus of Philosophy, New York University

Awards Ceremony

Saturday, November 10, 1984
(All meetings at Stanford University)

9:30 A.M.–Noon

Space-Age Paranormal Claims

Moderator: **Robert Sheaffer**, science writer

Astrology Re-examined
Andrew Fraknoi, Director, Astronomical Society of the Pacific

The Status of UFO Research
J. Allen Hynek, Professor Emeritus of Astronomy, Northwestern University

Ancient Astronauts
Roger Culver, Professor of Astronomy, Colorado State University

UFOs in Perspective
Philip J. Klass, Senior Editor, *Aviation Week* and *Space Technology*

Lunch 12:00–2:00 P.M.

2:30–5:00 P.M.

The Psychic Arms Race

Moderator: **Paul Kurtz**, CSICOP Chairman and Professor of Philosophy, SUNY at Buffalo

Ray Hyman, Professor of Psychology, University of Oregon

Philip J. Klass, Senior Editor, *Aviation Week* and *Space Technology*

Martin Ebon, author, *The Psychic Arms Race*

Leon Jaroff, Managing Editor, *Discover* magazine

Dinner 5:00–7:30 P.M.

7:30–10:30 P.M.

Psychic Claims

Moderator: **Kendrick Frazier**, Editor, THE SKEPTICAL INQUIRER

Curing Cancer Through Meditation
Wallace Sampson, M.D., Stanford University

Hot and Cold Readings Down Under
Robert Steiner, magician

The Case of the Columbus, Ohio, Poltergeist
James Randi, magician

Explorations in Brazil
William Roll, Director, Psychical Research Foundation

Coincidence
Persi Diaconis, Professor of Statistics, Stanford University

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Quantum Theory and the Paranormal: The Misuse of Science

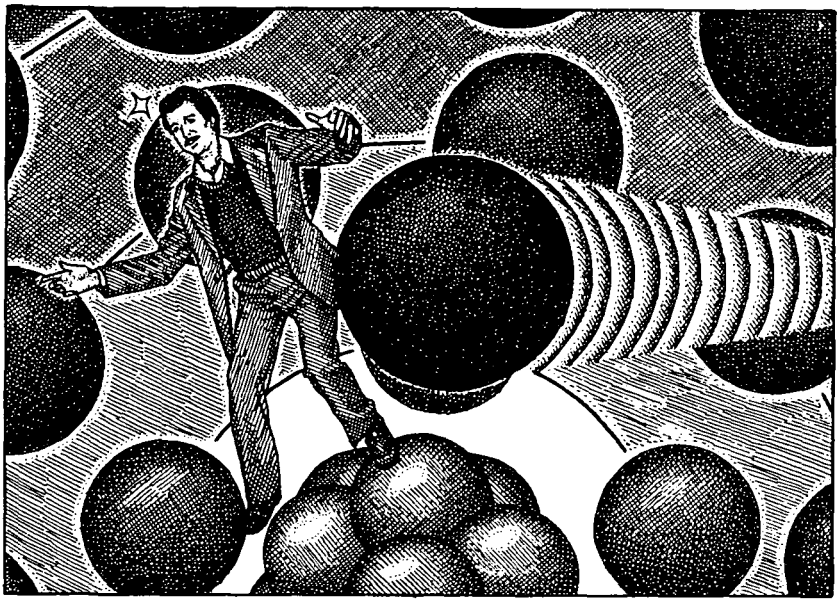
Psi promoters have picked up the jargon of quantum mechanics and in trying to apply it to the paranormal have confused vocabulary with substance.

Steven N. Shore

THE PSYCHIC WORLD has discovered microphysics. After having been oppressed for many years by physical arguments against precognition and remote viewing, the paranormalists have suddenly discovered a way out—the quantum world. It is a place where, it seems, anything can and will happen; where consciousness plays a physical role; where the "whole" is indivisible into its constituent parts; where all things communicate intimately with one another and all being is shared. In short, it is the realm in which lurk the processes long sought to explain all psychic and paranormal phenomena (astrology included).

This is the view recently promoted by several popular accounts of the "new physics": *The Tao of Physics* by Fritjof Capra, *The Dancing Wu Li Masters* by Gary Zukav, and *Physics as Metaphor* by Roger S. Jones.[1] They seek, in the noncausal and nondeterministic mazes of quantum mechanics (QM), the source of all "metaphysical" phenomena. The popularity of these books has been so great that they have even begun to contribute to the jargon of the parapsychologists. Vibrations of the vacuum, action at a distance, indeterminacy, and faster-than-light communication have begun to turn up in the speculations of those who try to provide some physical justification for their laboratory-based results. In the circles of the paranormalists, J. H. M. Whiteman and Russell Targ and Harold Puthoff have made the most extensive "public" cases for these explanations. Rather than examine the experimental claims of these investigators, which have been dealt with by other writers in these pages and elsewhere, I will simply examine the claims made by those who use the foundation of QM

Steven Shore is an astronomer. Until recently he was at the Warner and Swasey Observatory and Department of Astronomy of Case Western Reserve University and is now at the Space Telescope Science Institute in Baltimore.



to explain the paranormal.

The basic principles of QM can be stated simply: It is a language for describing the operations of a measuring device in a physical experiment at the microscopic level.[2] In this context, it allows one to envision the structure of microworld phenomena. The picture that dominates the popular perception is that of a very small observer making measurements on a physically discrete system—that of a quantum jump. The justification for even thinking that the status of a microsystem is dominated by discontinuous processes is drawn from atomic physics, where we see electron transitions in an atom taking place in discrete units, absorption and emission lines, between stationary states that are the energy levels. The fact that only certain levels appear to be allowed within an atom is analogous to the stationary states produced in a musical instrument. Musical notes are the product of a wave that reaches a stationary state (also called a standing wave). Without this analogy of an oscillation that is self-interfering unless certain conditions are maintained, the usual conception of the quantum leading to energy levels without permissible intermediates would appear logically—and experientially—incomprehensible. However, what we should keep in mind is that this is an empirical fact, not just an analogy.

This discreteness in the microscopic world can be viewed from two standpoints. One is that it is the product of our way of measuring the system, that we are requiring an all-or-nothing interpretation. The alternative is the existential approach, which, I think, is characteristic of most

working scientists: If this is what is demanded by nature, then our job is to provide the most complete description possible within the bounds of this phenomenology. The aim of QM, then, is to describe in an economical fashion the logical outcome of this picture of the microscopic world.

There is no question that the microscopic world presents many aspects that violate our macroscopically formed intuitions.[3] The deterministic world we apparently encounter daily is not coherently and completely adduced from quantum first principles. The Heisenberg uncertainty relations, in the form in which quantum theory states them, cannot necessarily be interpreted within the context of classical experience. Go to any standard text on QM, for example, and you will see the uncertainty principle stated in several different ways. The most popular, and probably the one held by most working physicists, is the so-called Copenhagen interpretation: The measurement process interferes with the system in such a way that the exact measurement of one process destroys the information available on any other system variable that is conjugate to it. This can be thought of as an artifact of the representation of the state, or of the details of the calculational procedure used in the determination of the expected outcome of any physical experiment. For example, in the famous gamma microscope experiment of Heisenberg (which he used to justify the uncertainty principle), the position of an electron under a microscope is measured by scattering a photon off the electron.[4] The momentum of the particle is disturbed (interfered with) by the scattering process in an unpredictable way, leading to an uncertainty in the momentum at the same time as we see certainty in our measurement of the position. Why? Because the quantum of the device with which we measure the system is on the same scale as the particle we wish to measure.

How do the parapsychologists (PPs hereafter) attempt to use QM to explain their results? First, in QM a composite system is seen as the product of the functions describing the individual states.[5] We can look at it this way. In human conception, there is a fifty-fifty chance that the fertilized egg will develop into a male and the same chance that it will develop into a female. In QM, we would be forced to represent this as a superposition of the two states. We know, however, that once the child is born, it is either one or the other. The philosophically minded physicist will say that before the moment of birth, while you are still in ignorance of the status of the fetus, the system is a purely superimposed state—male and female simultaneously. The measurement process—that is, the birth—instantly collapses the representation of the system to one or the other final state. Now of course the system is not in fact a superposition of the states. At the moment of fertilization the egg becomes genetically either male or female. However, since it has a finite probability of being either, the only description allowed by QM is that it is *both* until it can be directly measured. QM thus attempts to provide the entire spectrum of possible

measurements a priori; the fact that the real world only allows for one or the other to exist simply means that, in interpreting the final system, we classically describe the world as consisting of a limited number of outcomes.

The PPs now step in, insisting that the system really consists of the pregnant woman, her wishes for a child of a given sex, the doctors who will be involved in the delivery, the father who will have his own desires for the sex of the child, and the entirety of the world. All of these are *physically* acting on the fetus to determine the outcome of the birth process. In the world of the paranormal, then, the fact that QM demands a representation of any system as being intimately connected with outside influences—that QM represents every state as inherently mixed—means that even the influence of the positions of the stars must be taken into account in order properly to account for the nature of the fetus. Action at a distance by the stars and the psychic vibrations of the minds of the conscious participants should all be taken into account in the final determination of the sex of the child. As Targ and Puthoff state: ". . . the laws of physics do not absolutely forbid the transmission of information from the future to the present."[6]

At first, this appears to make some sense. After all, if the system (fetus) is in reality a subsystem (part of the mother, who is part of a family, which is part of the human population, which is a product of nature at large), all of the parts should be interconnected and therefore capable of mutual influence.

There is only one problem with this. In QM, most of the interactions of a system with the outside world are destroyed by incoherent processes, so that only those strong enough to have a direct influence on the system can act on it. The representation of the state may be a superposition of the entire "wave function" of the whole universe, but the effect of any part of the universe on the system is governed by the strength of its interaction.

For example, suppose we calculate the influence of a person on a transistor in a laboratory.[7] The transistor is an atomic device whose action results from the allowed states for the electrons due to the atomic structure of the crystal and voltage placed across it. If we look at the gravitational interaction of the observer with the device, we see that in comparison with the electromagnetic influences within the atomic structure of the transistor the strength of the couple is too weak to make any difference. If we look instead at the electromagnetic interaction between the observer and the device, we must calculate the rate of generation of electromagnetic waves from the observer and their rate of absorption by the transistor. This can be done quite simply within the physical machinery of QM. Again, we find that the effect is too weak to make any difference.

But, says the PP, we can postulate the existence of a field of unknown nature that represents the "interaction" of the observer with the transistor; we can then state that this interaction is responsible for any seemingly

paranormal phenomenon. After all, the PP says, the observer is part of the wave function of the system, so anything he does will influence the state of the system. His mere presence will influence the outcome of the experiment.

Unfortunately, the PPs insist on including the quantum mechanical action of the wave function in their supposed explanations of paranormal phenomena. The most recent of these is the attempt by Zukav in *The Dancing Wu Li Masters* to elevate Bell's theorem to the level of an epistemological breakthrough of world-shattering consequence.

Bell, who was fascinated by the problem of QM measurement, posed the following thought experiment.[8] Let us imagine that we have two electrons created initially in a singlet state—that is, they initially have spins anti-parallel to each other at the time of formation. You can envision this as trapeze flyers who link hands. Now allow these two electrons (trapeze artists) to separate in opposite directions in space. The singlet state is symmetric about the axes of motion (see Figure 1), and therefore we are

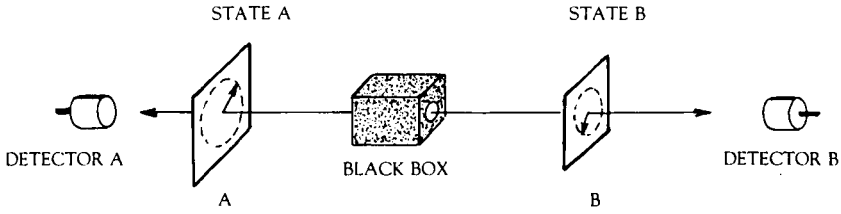


FIGURE 1

initially in ignorance about the axis along which each one has its spin aligned. One thing is certain, though. Since they were initially formed in the singlet state, any measurement made on one will immediately tell you the spin of the other—it must be opposite. The conundrum appears when we add the freedom of choice. The observer can allow the electrons to separate for a while and then choose *any* axis about which to look for the spin component. If the particles have been in flight long enough, they will be causally disconnected from each other, so that a signal traveling at the speed of light will not be able to traverse the space between them. He now makes the arbitrary measurement on one particle, and *voila!*—the other will be known to have exactly the opposite spin. However, since the observer could have chosen any axis at will, it would appear that the other particle knew about it just in time to properly anti-align along the same, arbitrarily chosen, axis.

The world of the Indivisible Whole appears again.

This result of Bell's theorem is exact in the mathematical sense. It

depends only on the notions of standard analysis—the probability interpretation of the psi-function and the QM-allowed types of mathematical operators.[9] It is, however, at this stage that the crux of the problem facing us is revealed. There must be a "dictionary" for translating Bell's inequalities into observational terms, and then yet another word list for putting it in philosophical perspective. All of QM works backwards from our observations, saying that the reality of the measurement is fixed by our choice of directions in which to measure.

Martin Gardner begins his excellent essay "Quantum Weirdness" with the following quotation from a baseball umpire: "Some is balls and some is strikes, but until I calls 'em, they ain't nothing."[10] We can continue this baseball analogy further in an explication of Bell's theorem. Imagine that we have a mythical ambidextrous pitcher who hurls two balls simultaneously in precisely opposite directions. We know in advance that one ball is blue and the other red but that they are otherwise identical. We give two catchers this rule of the game: Each is to call out the color of his ball as soon as he catches it. Thus, if the first one shouts out the color of the ball he receives as soon as he gets it, we will then know with certainty the color of the other one. Let us imagine, however, that after the pitches are thrown, at the last possible instant, one of the catchers capriciously takes a few steps backwards. This could change the order of the call, so that if the red ball would have been first we now have it as blue. Has this changed the colors of the balls in flight? Have the baseballs known in advance what the catcher would do and have they changed color in flight to accommodate the strategy? Obviously not. Yet this is the way in which the Bell theorem is interpreted by many folks of a philosophical bent.

Now, if we make these electrons and positrons, and assume that only the charges differ and that the catchers have charged mitts, the charges of which they can freely change at the last minute, the situation is closer to that imagined in Bell's experiment. Again, it would be nonsense to assert that the charges knew in advance what the charges of the glove would be.

There is nothing in this to aid the paranormalists, yet as soon as it is clothed in the language of QM the situation changes. The wave packet takes on the appearance of something that can circumvent the laws of everyday physics, an entity that knows its structure throughout spacetime at once and which can be altered by some form of action at a distance. In short, the "geistwellen" of de Broglie[11] have suddenly been transformed into real ghosts. The paranormal phenomena that require some explanation can be incorporated into the quantum theory by this advanced knowledge of the state of the world on the part of every constituent physical entity.

In the press recently, following the successful corroboration of QM by Aspect et al.,[12] a number of reports stated that action at a distance had at last been confirmed. Aspect and his colleagues found that Bell's conjectural thought experiment is in fact what is realized in the laboratory.

Put another way, Bell's theorem must be violated if QM is right, and if local measurements are not the sole determination of a body's properties. Several critical discussions of the uses of QM in parapsychological studies have been given in various places, but perhaps the most telling is the use of the methodology by the PPs themselves. The most recent is by Nash,[13] which represents a theory of extrasensory observations. His basic argument is that the extrasensory participation in the state of the system by the observer is felt before the direct measurement is made on the system, thereby causing a collapse of the state function for the system prior to direct measurement. That the system chooses which state it will be in on the basis of the ESP mode of interaction is not discussed, nor how the observer-to-be manages to control the state that the system will achieve.

This experiment is proof to the paranormalists not only of some form of action at a distance, but even more. To quote Zukav:[14]

> Superluminal quantum connectedness seems to be on the surface at least a possible explanation for some types of quantum phenomena. Telepathy, for example, often appears to happen instantaneously, if not faster. Psychic phenomena have been held in disdain by physicists since the days of Newton. In fact, most physicists do not even believe that they exist.

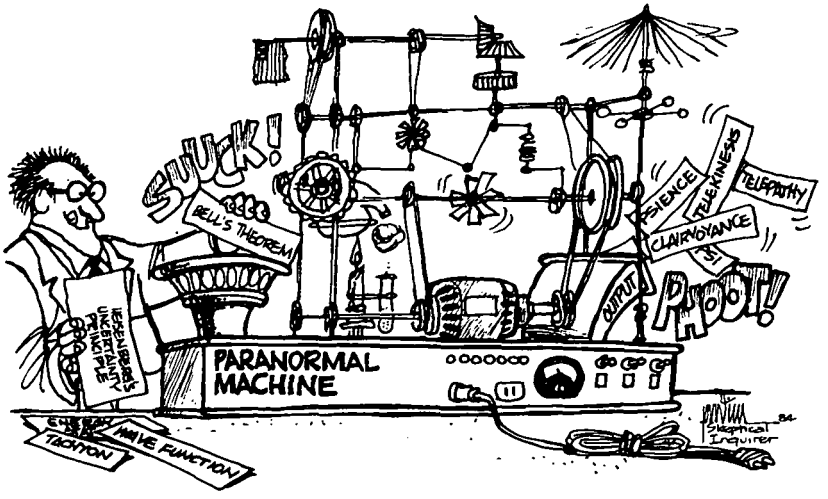
Zukav's comment that telepathy "appears to happen instantaneously, if not faster," seems to hark back to the tachyon, the hypothetical faster-than-light particle so popular about two decades ago. But let us continue with his invocation of Bell:[15]

> In this sense, Bell's theorem could be the Trojan Horse in the physicists' camp; first, because it proves that quantum theory requires connections that appear to resemble telepathic communication and second, because it provides the mathematical framework through which serious physicists [all physicists are serious] could find themselves discussing types of phenomena which, ironically, they do not believe exist.

It should be understood that Bell has never made such claims. His articles on QM theory of measurement have been sober and balanced, pointing to the necessity for studying in detail the consequences of QM predictions in light of classical concepts of local causation. The more ardent among his popularizers, though, have not let themselves be hindered by this conservatism. Zukav even references Targ and Puthoff in his footnote, who are referred to as exceptions among physicists in holding paranormal beliefs.

Targ and Puthoff, in *Mind-Reach,* invoke Bell's theorem as follows:[16]

> This Quantum Connection is codified in a theorem of great elegance known



as Bell's Theorem. This theorem emphasizes that no theory of reality compatible with Quantum Theory can require spatially separated events to be independent. Rather it must permit physically separated events to interact with each other in a manner that is contrary to ordinary experience. This aspect of modern theory, which is experimentally tested and confirmed, reveals that parts of the universe apparently separated from each other can nonetheless act together *as parts of a larger whole* [emphasis added], a statement more expected to be found in mystical writings than in a theory of physics.

Bell's theorem is concerned with the outcome of measurements on systems that obey QM. That is, as has been said of other theories of measurement, the predictions of QM are obeyed by quantum mechanical particles—a somewhat circular statement but an important one for understanding the nature of the theorem. After the particles separate it seems a natural assumption that they retain their correlated state; thus, any measurement of one particle can predict with certainty *exactly* the state in which the other particle will be measured.

In conclusion, some discussion of a few basic objections to the paranormal uses of science are in order. For the sake of discussion, let us dub this kind of theorizing *psience,* for contrast.

In any physical theory, the basic test of the theory and its attendant and necessary models is calculation and observation. A theory that serves simply to provide post hoc explanations serves no purpose other than as a

convenient tool with which to organize a diffuse body of empirical data. The ultimate use of these theories is to do more. That the data are collected is very nice, but the unification of these phenomena can only be achieved once the underlying causes are perceived, tests of these causes proposed, and the results of the tests predicted. This is precisely the opposite of psience.

In the realm of psience, any phenomenon is a thing in itself. There are no attempts to discover direct, causal relationships among these phenomena. As Bunge has pointed out, there is a lack of overall axiomatics in the conduct of inquiry. However, another point has been missed. The psientist, like the popularizer of normal science, is content to stop at the analogy. If a field of normal science presents what appears, by linguistic or pictorial analogy, a model having some of the same properties as the phenomenon the psientist is investigating, he will immediately grasp it and make it the explanation for his findings. As we have seen, there are similarities between the philosophical underpinnings of QM and some paranormal phenomena. That should not imply that there is any direct model-explicans link between the two realms. Yet the jargon of QM has become so diffused into psience that the vocabulary has become an explanation in itself—buzz words have become a replacement for calculation. This is a pathological state of scientific investigation, not normal science. It is indeed true that science has more than its share of punsters and jokers—one need only call to mind *glueballs, quarks, selfish genes,* and *hopping electrons*—but these are the clothing on the body of the theory, the mode of discourse only and not its substance.

An example of this use of jargon to replace results is the article by Whiteman in the *Handbook of Parapsychology:*[17]

> It seems therefore that any attempt to unite parapsychology with physics should adhere, substantially at least, to the language of quantum field theory in terms of "as if" fields at a level of creative potentiality.

Whiteman attempts to take the analogy of fields into the domain of the creative potential of the mind, by twisting the word *potential* (meaning possibility) to fit *potential field*—the chosen representation of the action of a force at the microlevel (as in magnetic or other particle exchange-induced fields). He goes further:[18]

> Thus above, and below, the level of scientific laws, which are substantially field equations, there is a cutoff in normal scientific thinking. The "laws of universal causation" appealed to by opponents of parapsychology and the behaviorists . . . [reference omitted] do not exist in the form supposed.

To speak of wave functions for a system and not discuss the Schroe-

dinger or Dirac equations, to speak of action at a distance without relativity or electrodynamics and Maxwell's equations, to talk about backwards causality and not mention the details of the Boltzmann equation or the Hamiltonian of a many-body system, is to behave like Mrs. Malaprop in *The Rivals,* who used to "deck her dull chat with hard words which she don't understand." No calculation within physics has ever produced a psientific result—nor can it, according to the psientists' own mode of conduct.

The psientists are not interested in results—only phrases. And in that guise, they have successfully hoodwinked many into thinking that they too can speak prose, like Molière's bourgeois gentleman, when within the context of normal science they have been doing so all of their lives. The physical world is understood not by speaking about it, or using colorful language to picture it, but by empirically and theoretically (mathematically) dissecting it. It is only, I believe, within this frame of mind that we will ever be able to peel away, in Plato's words, the veil of the unknown. That is only achieved by the action of manipulation, physically and intellectually, and not by blowing out hot air.

Acknowledgments

I wish to thank Dr. Nick Sanduleak for innumerable discussions and suggestions over the years on matters of both science and the response of the scientific community to the paranormalists. I also wish to thank Drs. Mario Bunge, James Alcock, and Paul Kurtz for their encouragement and comments during the CSICOP conference in Amherst, New York, in October 1983. Finally I wish to thank Dr. Lys Ann Shore for advice and assistance in the preparation of this paper. Some of the material discussed here has been presented in courses taught at Case Western Reserve University and at New College, University of Toronto, over the past few years, and was discussed at the CSICOP meeting during the session on parapsychology.

Notes

1. F. Capra, *The Tao of Physics* (Berkeley: Shambala Books, 1975); G. Zukav, *The Dancing Wu Li Masters* (New York: Morrow, 1979); R. S. Jones, *Physics as Metaphor* (New York: Meridian, 1982). See also M. Gardner, *Science: Good, Bad, and Bogus* (New York: Avon, 1981), p. 375, for a review of Zukav's books and for several good essays on the introduction of QM into the discussion of parapsychological phenomena in the past ten years.

2. B. d'Espagnat, "The Quantum Theory and Reality," *Scientific American,* November 1979, p. 158; W. H. Cropper, *The Quantum Physicists* (New York: Oxford University Press, 1970); G. Gamow, *Thirty Years That Shook Physics*

(New York: Anchor-Doubleday, 1966). Perhaps the best historical, and yet rigorous, introduction available is M. Jammer, *The Conceptual Development of Quantum Mechanics* (New York: McGraw-Hill, 1966), which has an excellent introduction to the EPR (Einstein-Padolsky-Rosen) paradox. See also M. Jammer, *The Philosophy of Quantum Mechanics* (New York: John Wiley, 1974).

3. For an excellent example of just how even the epistemology of the physicist is stretched by the problems of QM, see N. Bohr, "Epistemological Discussions with Einstein," *Atomic Physics and Human Knowledge* (New York: Science Editions, 1961), p. 32 ff. See also M. Born, *Experiment and Theory in Physics* (New York: Dover, 1956); L. Eisenbud, *The Conceptual Foundations of Quantum Mechanics* (Princeton: Van Nostrand Reinhold Momentum Books, 1971); A. Petersen, *Quantum Physics and the Philosophical Tradition* (Cambridge, Mass.: MIT Press, 1968; D. Bohm, *Causality and Chance in Modern Physics* (Philadelphia: University of Pennsylvania Press, 1957). There is, of course, a vast literature on this subject and many very fine introductory texts, but these are some of the more basic works that deal with the intellectual development of the subject, and it is usually these that are the basis of the paranormalists' arguments—not the ones that contain the worked problems solving the various cases for the Schroedinger equation.

4. See. W. Heisenberg, *The Physical Principles of Quantum Theory* (New York: Dover Books, 1930), and also W. Heisenberg, *Physics and Philosophy* (New York: Harper Torchbooks, 1958).

5. d'Espagnat, op. cit.; Jammer (1966), op. cit.

6. R. Targ and H. Puthoff, *Mind-Reach* (New York: Delacorte Press, 1977), p. 118.

7. The work of H. Schmidt, discussed extensively in *SI* in recent years, comes to mind here.

8. J. S. Bell, *Rev. Mod. Phys.*, 38 (1966): 447; d'Espagnat, op. cit. J. S. Bell, "Introduction to the Hidden-Variable Question." in *Foundations of Quantum Mechanics,* ed. B. d'Espagnat (New York: Academic Press, 1971), p. 171: One point may be noted: "It is easy to imagine that the classical domain could be extended to cover the whole. The wave functions would prove to be a provisional or incomplete description of the quantum-mechanical part, of which an objective account would become possible. It is this possibility, of a homogeneous account of the world, which is for me the chief motivation of the study of the so-called 'hidden-variable' possibility" (p. 172).

It is important to note that Bell was nonetheless most concerned with the formal structure of QM measurement and not of the more general applications of the wave function, since he deals only with the results of the processes and not the detailed description of the processes on the atomic level through the equations of structure and evolution.

9. See J. F. Clauser and A. Shimony, *Rep. Prog. Phys.*, 41 (1978): 1881, for the most comprehensive review of the Bell theorem and its various experimental consequences.

10. M. Gardner, *Order and Surprise* (Buffalo: Prometheus, 1983), p. 195.

11. The wave-particle picture derives from the scattering of X-rays by electrons (the Compton experiment) and the *analogy* of photon and particle behavior.

This was first adduced in more direct form by de Broglie from the behavior of X-rays and from the photoelectric effect. It is still a hard conceptual step for most students to make in the course of their education in physics. That a massive, presumably distended, body can be endowed with wavelike properties seems outlandish. It is, however, the basis of all subsequent exact calculations using the Schroedinger equation. The particular representation is dictated by a frustratingly obscure but postulationally useful insight—if a particle behaves *like* a wave (think of a fuzz-ball) then the equations of motion have a formal analogy in the wave equation. Actually, this is not a strict analogy and a technical note is in order here. The wave equation is a mathematical device that has its solutions specified completely by its initial conditions. This is what is meant by strict causality. The result can be expressed by using the familiar space-time diagram. Causality appears because the signals propagate from past to future, and through space, at a fixed speed, *c*, the finite velocity of light. All electromagnetic phenomena propagate at this speed. Even gravity waves have this rate of propagation of their influence. The Schroedinger equation, because of the formal analogy with waves, does have a similar time dependence but is really a diffusion equation and is therefore not strictly causal—it represents the random walk of the particle through spacetime. This is fundamentally different from EM waves and has served as the point of epistemological departure for those who are concerned about the relation between microscopic and macroscopic phenomena and their descriptions.

12. A. Aspect, P. Grangier, and G. Roger, *Phys. Rev. Letters,* 49 (1982):91; A. Aspect, J. Dalibard, and G. Roger, *Phys. Rev. Letters,* 49 (1982):1804. The latter states, explicitly: "Let us emphasize that such results cannot be taken as providing the possibility of faster-than-light communication."

13. Nash, *JSPR,* 1983.

14. G. Zukav, op. cit., p. 301 f.

15. Ibid., p. 302.

16. Op. cit., p. 170 f.

17. J. H. M. Whiteman, in *Handbook of Parapsychology,* ed. B. B. Wolman (Princeton; Van Nostrand Reinhold, 1977), p. 730.

18. Ibid. •

What Is Pseudoscience?

Pseudoscience can be clearly distinguished from science only if a number of features are checked

Mario Bunge

This article and Professor Toulmin's, which follows it, are based on papers presented in the session "Parascience and the Philosophy of Science" at CSICOP's international conference on "Science, Skepticism, and the Paranormal," October 28–29, 1983, at SUNY-Buffalo.

MOST PHILOSOPHERS have attempted to characterize science, and correspondingly pseudoscience, by a single feature. Some have chosen consensus as the mark of science, others empirical content, or success, or refutability, or the use of the scientific method, or what have you. Every one of these simplistic attempts has failed. Science is far too complex an object to be characterizable by a single trait—and the same holds for pseudoscience. Just as we must check a number of properties in addition to color and brilliance in order to make sure that a chunk of metal is not fake gold, so we must examine a number of features of a field of knowledge to ascertain whether it is scientific.

We shall characterize a science, as well as a pseudoscience, as a cognitive field, genuine or fake. A *cognitive field* may be characterized as a sector of human activity aiming at gaining, diffusing, or utilizing knowledge of some kind, whether this knowledge be true or false. There are hundreds of cognitive fields in contemporary culture: logic and theology, mathematics and numerology, astronomy and astrology, chemistry and alchemy, psychology and parapsychology, social science and humanistic sociology, and so on.

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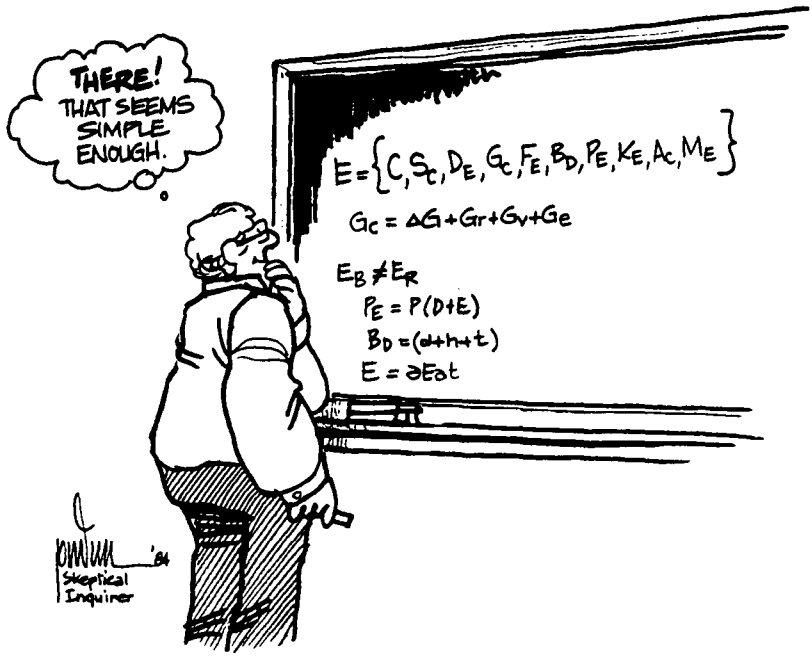

THERE! THAT SEEMS SIMPLE ENOUGH.
$E = \{C, S_t, D_E, G_c, F_E, B_D, P_E, K_E, A_c, M_E\}$
$G_c = \Delta G + Gr + Gv + Ge$
$E_B \neq E_R$
$P_E = P(D+E)$
$B_D = (d+h+t)$
$E = \partial Eat$
Skeptical Inquirer

Cognitive Fields

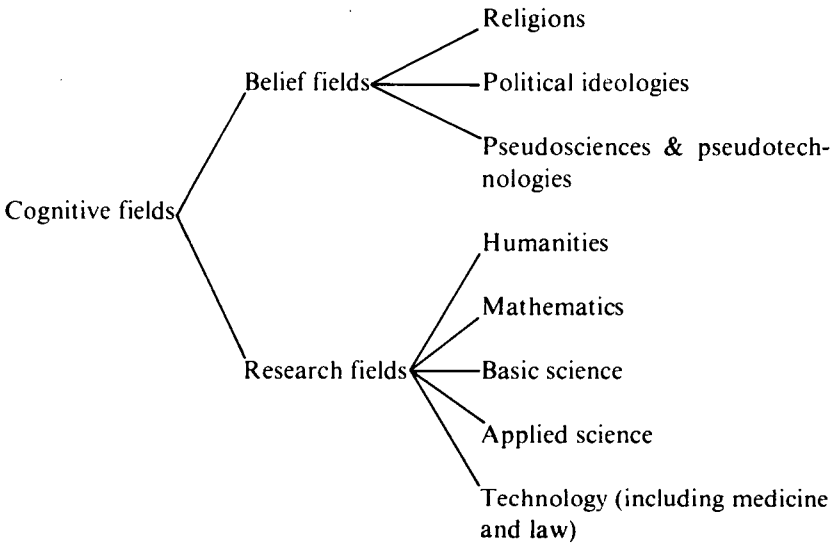
Whether or not a given cognitive field is successful in attaining truth or power, understanding or popularity, it shares a number of characteristics with other cognitive fields. (See Bunge 1983a.) These characteristics are encapsulated in the ten-tuple

$$E = (C, S, D, G, F, B, P, K, A, M),$$

where, at any given time,

- C = *Cognitive community*
- S = *Society hosting C*
- G = *General outlook,* or world-view, or philosophy of the *C's*
- D = *Domain* or universe of discourse of E: the objects E is about
- F = *Formal background:* logical and mathematical tools employable *in E*
- B = *Specific background,* or set of presuppositions about D borrowed from fields of knowledge other than E
- P = *Problematics,* or set of problems E may handle
- K = *Specific fund of knowledge* accumulated by E
- A = *Aims* or goals of the *C*'s in cultivating E
- M = *Methodics* or collection of methods utilizable in E

The family of fields of knowledge is not homogenous. In fact it may be split into two disjoint sets: the family of *research fields* and that of *belief fields*. Whereas a research field changes all the time as a result of research, a belief field changes, if at all, as a result of controversy, brute force, or revelation. This, then, is the great divide:



Science

We now proceed to define the concept of science. (For details see Bunge 1983b.) We stipulate that a particular science, such as physics, biology, or sociology, is a cognitive field $E = (C, S, D, G, F, B, P, K, A, M)$ such that:

1. Every one of the ten components of *E changes*, however slowly, as a result of inquiry in the same field as well as in related fields (particularly those supplying the formal background F and the specified background B and E).

2. C, the research community of E, is a system composed of persons who have received a specialized training, hold strong information links among themselves, and initiate or continue a tradition of inquiry.

3. The society S, which hosts C, encourages or at least tolerates the activities of the components of C.

4. The domain D is composed exclusively of (certified or putatively) *real entities* (rather than, say, freely floating ideas) past, present, or future.

5. The *general outlook* or *philosophical background* consists of (*a*) an ontology according to which the real world is composed of *lawfully changing concrete things* (rather than, say, of unchanging, or lawless, or ghostly things); (*b*) a *realistic theory of knowledge* (rather than, say, an

idealistic or a conventionalist one); (*c*) a *value system* enshrining clarity, exactness, depth, consistency, and truth; (*d*) *the ethos of the free search for truth* (rather than, say, that of the bound quest for utility or for consensus or for conformity with dogma).

6. The formal background F is a collection of *up-to-date logical or mathematical theories* (rather than being empty or formed by obsolete formal theories).

7. The specific background B is a collection of *up-to-date and reasonably well confirmed* (yet not incorrigible) *data, hypotheses, and theories* obtained in other fields of inquiry relevant to E.

8. The problematics P consists exclusively of cognitive problems concerning the nature (in particular the laws) of the members of D, as well as problems concerning other components of E.

9. The fund of knowledge K is a collection of *up-to-date and testable* (though not final) theories, hypotheses, and data compatible with those of B and obtained in E at previous times.

10. The aims A include discovering or using the laws of the D's, systematizing (into theories) hypotheses about D's, and refining methods in M.

11. The methodics M contains exclusively scrutable (checkable, analyzable, criticizable) and justifiable (explainable) procedures.

12. E is a component of a wider cognitive field, i.e., there is at least one other (contiguous) research field such that (*a*) the general outlooks, formal backgrounds, specific backgrounds, funds of knowledge, aims, and methodics of the two fields have nonempty overlaps, and (*b*) either the domain of one field is included in that of the other, or each member of the domain of one of them is a component of a system belonging to the other domain.

Any cognitive field that fails to satisfy all twelve of the conditions above will be said to be *nonscientific*. Classical examples: theology and literary criticism. And any cognitive field that, though nonscientific, is advertised as scientific will be said to be *pseudoscientific*. The reader is encouraged to check for himself whether his or her favorite science or pseudoscience satisfies the definition above.

Pseudoscience

In case our definition of pseudoscience is found as unsatisfactory as defining "fake art" as "not genuine art," let us propose an alternative characterization in positive terms. We propose to call a field of knowledge $E = (C, S, D, G, F, B, P, K, A, M)$ a *pseudoscience* if it satisfies jointly all the following conditions:

1. The ten components of E change but *little* in the course of time and, if they do happen to change, they do so in limited respects and as a

result of controversy or external pressures rather than of scientific research.

2. C is a community of *believers* who call themselves scientists, although they do not conduct any scientific research or they engage in research practices that are defective by scientific standards.

3. The host society S supports C for practical reasons (e.g., because E is good business) or tolerates C while relegating it beyond the border of its official culture.

4. The domain D teems with *unreal* or at least not certifiably real entities, such as astral influences, disembodied thoughts, superegos, and the like.

5. The general outlook G includes either (*a*) an ontology countenancing immaterial entities or processes, such as disembodied spirits, or (*b*) an epistemology making room for arguments from authority or for paranormal modes of cognition accessible only to the initiates or to those trained to interpret certain canonical texts, or (*c*) a value system that does not enshrine clarity, exactness, depth, consistency, or truth, or (*d*) an ethos that, far from facilitating the free search for truth, recommends the staunch defense of dogma, including deception if need be.

6. The formal background F is usually modest. Logic is not always respected and mathematical modeling is the exception rather than the rule. The few mathematical models that have been proposed (e.g., for psi phenomena) are not experimentally testable, so they are phony.

7. The specific background B is small or nil: a pseudoscience learns little or nothing from other cognitive fields. Likewise it contributes little or nothing to the development of other cognitive fields.

8. The problematics P includes many more practical problems concerning human life (in particular how to feel better and influence other people) than cognitive problems.

9. The fund of knowledge K is practically stagnant and contains numerous untestable or even false hypotheses in conflict with well-confirmed scientific hypotheses. And it contains no universal and well-confirmed hypotheses.

10. The aims A of the members of C are often practical rather than cognitive, in consonance with its problematics P. And they do not include the typical goals of scientific research, namely, the finding of laws or their use to understand and predict facts.

11. The methodics M contains procedures that are neither checkable by alternative (in particular scientific) procedures nor justifiable by well-confirmed theories. In particular, criticism is not welcomed by pseudoscientists.

12. There is no field of knowledge, except possibly another pseudoscience, that overlaps with E and is thus in a position to control or enrich E. That is, every pseudoscience is practically isolated: There is no such thing as the system of pseudosciences paralleling that of the genuine

sciences.

This general picture is supplemented by Table 1, which exhibits typical attitudes and activities of scientists and pseudoscientists. (Admittedly some scientists do not behave scientifically on occasion. But this is beside the point; we are concerned with norms or ideal behavior.)

TABLE 1
Comparison of Attitudes and Activities of Scientists and Pseudoscientists

	Scientist			Pseudoscientist		
Typical Attitudes and Activities	Yes	No	Optional	Yes	No	Optional
Admits own ignorance, hence need for more research	x				x	
Finds own field difficult and full of holes	x				x	
Advances by posing and solving new problems	x				x	
Welcomes new hypotheses and methods	x				x	
Proposes and tries out new hypotheses	x					x
Attempts to find or apply laws	x				x	
Cherishes the unity of science	x				x	
Relies on logic	x					x
Uses mathematics	x					x
Gathers or uses data, particularly quantitative ones	x					x
Looks for counterexamples	x				x	
Invents or applies objective checking procedures	x				x	
Settles disputes by experiment or computation	x				x	
Falls back consistently on authority		x		x		
Suppresses or distorts unfavorable data		x		x		
Updates own information	x				x	
Seeks critical comments from others	x				x	
Writes papers that can be understood by anyone		x		x		
Is likely to achieve instant celebrity		x		x		

Parapsychology: Science or Pseudoscience?

Pseudoscience is a body of beliefs and practices but seldom a field of active inquiry; it is tradition-bound and dogmatic rather than forward-looking and exploratory. (In this respect it resembles ideology and, in

particular, religion.) For example, I have never heard of psychoanalytic, chiropractic, or homeopathic laboratories; only parapsychology, which deals with so-called spiritualistic, psychic, or extrasensory phenomena, is research-oriented. However, it fails to meet all the conditions listed previously for a cognitive field to be scientific. Let us check them, leaving the details to specialists such as Hansel (1980), Alcock (1981), and Randi (1982).

1. *Domain.* Parapsychology is avowedly about immaterial entities, such as disembodied spirits, the existence of which has never been established. So, it is a discipline without a subject matter. On the other hand, parapsychology (just as psychoanalysis and mentalistic psychology) ignores the very organ of the mind, namely, the brain.

2. *General outlook.* The philosopher C. D. Broad (1949) examined carefully the compatibility of parapsychology with the scientific worldview, which he called a "set of limiting principles," and concluded that parapsychology does not comply with them—whence they, not parapsychology, were given up by parapsychologists. For example, precognition violates the principle of antecedence ("causality"), according to which the effect does not happen before the cause. Psychokinesis violates the principle of conservation of energy as well as the postulate that mind cannot act directly on matter. (If it did, no experimenter could trust his own readings of his instruments.) Telepathy and precognition are incompatible with the epistemological principle according to which the gaining of factual knowledge requires sense perception at some point.

3. *Formal background.* The typical parapsychologist does not excel at handling formal tools, in particular, statistics. (See, e.g., Diaconis 1978.) Thus he consistently selects the evidence ("optional stopping" of a sequence of trials); he does not distinguish a coincidence (accidental or spurious correlation) from a causal relation or a genuine correlation; and he is not fond of mathematical models or even of informal hypothetico-deductive systems; his few hunches are stray.

4. *Specific background.* Parapsychologists make no use of knowledge gained in other fields, such as physics and physiological psychology. Moreover, they usually claim that the sciences are wrong or that they do not cover psychic phenomena. Worse, the (few and ancient) hypotheses of parapsychology are inconsistent with some of the basic assumptions of science. In particular, the very idea of a disembodied mental entity is incompatible with physiological psychology (see Bunge 1980). Worse, parapsychologists brush such inconsistencies aside.

5. *Problematics.* Parapsychology is extremely poor in problems: they all boil down to that of establishing at all costs that there are paranormal phenomena, i.e., facts that cannot be explained by normal science. Nor is this problem formulated in clear terms, and this because of the appalling theoretical indigence of parapsychology.

6. *Fund of knowledge.* Despite being several thousand years old and having attracted a large number of researchers over the past hundred years, we owe no single firm finding to parapsychology: no hard data on telepathy, clairvoyance, precognition, or psychokinesis, and no verisimilar hypotheses to explain the mechanisms of such alleged phenomena. All parapsychologists tell us is that their alleged data are anomalous, i.e., unexplained by the science of the day. Compare this behavior with that of a scientist, say an astronomer. If he were to find that a certain celestial object does not seem to "obey" the laws of celestial mechanics or of astrophysics, he would feel it his duty to offer or invite some positive conjectures—e.g., that it is not an ordinary body but a quasar or a black hole, a plasma or a laser beam, or some other physical thing. He may conjecture that this thing of a new kind "obeys" laws not yet discovered—but not that it violates well-established physical principles such as the conservation of energy. The parapsychologist does no such thing; he accepts apparently anomalous phenomena as evidence for paranormal abilities and takes no steps to explain them in terms of laws. Has anyone heard of the First Law of Clairvoyance, or the Second Law of Telepathy, or the Third Law of Psychokinesis? And has anyone ever constructed a perpetual motion engine driven by the mind, or a mathematical theory of spooks capable of making definite testable predictions?

7. *Aims.* Judging by the achievements of parapsychologists, their aim is not that of finding laws and systematizing them into theories in order to understand and forecast. Rather, their ultimate aim is either to buttress ancient myths or to serve as a surrogate for declining religions.

8. *Methodics.* The methods employed by parapsychologists have been scrutinized by scientists, statisticians, and stage magicians for more than a century and found almost invariably faulty. The most common defect is lack of strict controls. But deception—either unconscious, as in the case of the ordinary experimental subject who wishes the experimenter to succeed, or deliberate, as in the famous case of the spoon-benders—has always plagued parapsychology. (For plenty of amusing examples, peruse the back numbers of this journal.)

9. *Systemicity.* Far from being a component of the system of human knowledge, parapsychology is a stray; it makes no contact with other research fields. Therefore, its practitioners ask that it be judged on its own merits: on the strength of the empirical evidence they claim to have produced. But this is impossible, quite aside from the fact that such "evidence" is quite suspicious for having been produced with faulty methods—not to speak of old folk stories and other anecdotal "evidence" still going strong among parapsychologists. Indeed, any fact can be "read" or "interpreted" in a number of ways—i.e., explained by alternative hypotheses. This is reason that only hypotheses harmonizing with several other hypotheses are worth being investigated. This is not the case with the parapsychological

hunches; they do not form a (hypothetico-deductive) system, and they do not agree with science. (Recall point 4 above.) Moreover, parapsychologists themselves are proud of investigating phenomena, or rather pseudo-phenomena, that they regard as paranormal for lying beyond the reach of "official" (i.e., ordinary) science.

10. *Changeability*. Parapsychology cannot be said to be moving fast—let alone forward—the way every genuine science does these days. In fact, it is a collection of archaic beliefs that go back to primitive animism. Parapsychologists keep retesting the same conjectures over and over again without ever obtaining any conclusive results.

We conclude that parapsychology passes muster as a pseudoscience. If it is not always recognized as such it may be because a simplistic conception of science is presupposed. (A case in point is Marcello Truzzi's claim [1980] that, for a field to be scientific, it suffices that its practitioners employ the scientific method.)

Protoscience and Unorthodoxy

There is always the fear that some gold nuggets may lie hidden in a pile of pseudoscientific rubbish, that the latter may be nothing but protoscience, or emerging science. Such fear is quite justified in the beginning, particularly since an extremely original theory or technique—an unorthodoxy—may smack of pseudoscience just because of its novelty. But skepticism must succeed caution, and skepticism must in turn be replaced with denunciation if the novelty fails to evolve into a full-fledged component of science at the end of, say, half a century. Indeed, whereas the protosciences advance and end up by becoming sciences, the pseudosciences are stagnant pools on the side of the swift current of scientific research.

That "there may be something" in the odd claim of some pseudoscience is true but another matter. Thus the alchemists were right in holding that lead can be transmuted into gold. But they were wrong in believing that they would eventually bring about such transmutation, for (*a*) they lacked the necessary theory (of nuclear structure), (*b*) they lacked the necessary tool (particle accelerator), and (*c*) they lacked the possibility of acquiring either theory or tool, because they were hooked to tradition (in particular the four elements theory) and put their faith in dogma, in trial and error (rather than in well-designed experiment), and in magical incantation. So the modern discovery of (genuine) transmutation was just a coincidence—the more so since the alchemists rejected atomism.

Likewise telepathy may be a fact after all—though not clairvoyance, precognition, or psychokinesis, all of which conflict with basic physical laws. However, if the thought transmission does exist, then it must be a physical process. So, if it were discovered, it would not confirm parapsychology, but would become a subject of ordinary scientific research,

like the transmutation of lead into gold. Such discovery would be the *coup de grâce* of parapsychology, just as the chemistry of Boyle finished off alchemy and Newtonian astronomy killed astrology.

Scientific unorthodoxy is a different kettle of fish altogether; it is just unconventional or unpopular science. Field physics was unorthodox when it was first proposed, for it disagreed with the then-dominant action-at-a-distance theories. But it was a genuine scientific field, rife with testable hypotheses and stunning new experiments, and very soon it swallowed whatever could be salvaged from the action-at-a-distance theories. The same can be said of all the scientific unorthodoxies that followed, such as Darwin's theory of evolution, Marx's criticism of capitalism, statistical mechanics, the two relativities, the two quantum theories, the synthetic theory of evolution, molecular biology, physiological psychology, and so on. All of these were, to borrow Isaac Asimov's apt expression, *endoheresies*—deviations within science—to be distinguished from *exoheresies*, or deviations from science. Endoheresy should be welcomed in science, exoheresy not. Tolerance, yes, but within science; there is no (intellectual) salvation outside it.

It does not follow that science lacks internal enemies. It does have them, but they are easily identifiable because they are nonscientific fragments that can be extracted without any loss to genuine knowledge. The most dreadful such fifth columns of science are excessive tolerance for ideas or practices that run against the grain of science (such as reading printed stuff without looking) and dogmatism, in particular the refusal to discuss matters of principle. Students of pseudoscience are currently divided about which of the two, pseudoscience or scientific dogma, is the more harmful. In my view the question is ill formulated and the usual way of handling it is nonscientific. The appropriate question is not just "Which is worse?" but rather "Which is the most harmful to whom and in what respect?" And the latter question should be investigated empirically rather than argued about, for it concerns factual matters; the problem is one for the psychology, the sociology, and even the economics of knowledge (and ignorance). Let me explain.

Presumably pseudoscience can do little harm to the scientific specialist, who is, however, constantly in danger of yielding to successful ideas and techniques—which, if taken as definitive, will end up by blocking progress. On the other hand, the layman, knowing little or nothing about the scientific orthodoxies of the day, is at the mercy of a number of superstitions, both those he learned as a child and those the mass media tout as scientific. Not being equipped to distinguish the genuine product from the fake, the layman is presumably more likely to buy the latter if only because he sees far more of it. (Besides the greater exposure, there is what William James called the will to believe. Many who embrace superstitions, old or new, do so because they feel the need for some extra support to face the struggle

for life.) In short, it would seem that, whereas scientific dogmatism is more harmful to scientists than to laymen, the latter have more to fear from pseudoscience.

Recyclable Rubbish or Virus?

Scientists and philosophers tend to treat superstition, pseudoscience, and even antiscience as harmless rubbish, or even as proper for mass consumption; they are far too busy with their own research to bother about such nonsense. This attitude is most unfortunate for the following reasons. First, superstition, pseudoscience, and antiscience are not rubbish that can be recycled into something useful; they are intellectual viruses that can attack anybody, layman or scientist, to the point of sickening an entire culture and turning it against scientific research. Second, the emergence and diffusion of superstition, pseudoscience, and antiscience are important psychosocial phenomena worth being investigated scientifically and perhaps even used as indicators of the state of health of a culture. Third, pseudoscience and antiscience are good test cases for any philosophy of science. Indeed, the worth of such philosophy can be gauged by its sensitivity to the differences between science and nonscience, high-grade and low-grade science, and living and dead science.

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The New Philosophy of Science and the 'Paranormal'

The task of demarcating between the real sciences and pseudoscience has had a long and complex history. That history should induce a certain modesty.

Stephen Toulmin

OVER THE PAST thirty years, there has been a major shift of focus on the part of many philosophers of science. This has been associated with a new recognition of the depth and importance of historical change as a factor in shaping our scientific beliefs, ideas, and presuppositions, and in determining the contexts of scientific discovery and even the methods of scientific research. The most widely read book in this new vein has, of course, been Thomas Kuhn's *The Structure of Scientific Revolutions*. But this work is only the tip of an iceberg, and it is perhaps too vague, superficial, and lacking in detail to help us in any examination of the claims of the paranormal. It is too easy, for instance, for parapsychologists and others to claim the Kuhnian protection of working according to "a different paradigm." So, here, let me indicate in my own terms—without any resort to the jargon of paradigms—what implications the current shift in philosophy of science has for the work of the Committee for the Scientific Investigation of Claims of the Paranormal.

Our immediate predecessors (as is well known) hoped that the work of defining a proper "method" for the sciences would yield a *unique* method, applicable to the subject matter of any science and notably to a given science at any stage in its historical development. Thus they sought to move beyond the position of (say) Aristotle, who claimed that each different kind of problem and subject matter needed to be analyzed,

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discussed, and explained in correspondingly different terms. In turn, they hoped that they could find the basis for a sharp, clear, and above all *permanent* criterion—the so-called demarcation criterion—for telling sciences whose students have some genuine claim to be proceeding rationally and methodically from "pseudosciences," which might pretend to deserve scientific status but fail to meet the required tests.

The newer approach to philosophy of science moves away from the more extreme claims of (say) the Viennese philosophers of the 1920s and 1930s. It begins from the observation that any *universal and timeless* account of scientific method—and, with it, any universal and timeless demarcation criterion for telling "real" sciences from pseudosciences—is also, unavoidably, an *abstract* account. We may respectfully tip our hats to the idea that true scientists should pay attention to, for instance, the quality and quantity of the "evidence" available to them, the strength of the "support" it lends to any given "hypothesis," the "observations" that might conceivably "falsify" that hypothesis, and the scope of the "predictions" and "explanations" to which it leads. But all of this is so much apple pie. The universality of the demands in question is purchased at the price of losing touch with the real work of the sciences.

For example, the standards that determine what counts as a scientific "prediction" vary between one science and another, and even from one phase to another in the development of any particular science. So, before we can apply these formal, abstract demands to actual scientific situations, we must pay attention *also* to certain specific, concrete features that are distinctive of any given science at this or that stage in its history; and it turns out that most of these features are highly variable, both among different sciences and among historical epochs. Correspondingly, all the general terms that the Viennese philosophers looked to as providing the universal and timeless indices of a science's rational status—*verify, falsify, predict,* and the like—turn out to be *multivocal:* They have a determinable sense only when understood in the particular ways appropriate to the problems of the science in question at the time in question.

So far, this is only prologue. If we take the new approach to philosophy of science seriously, we shall have to call up for reconsideration a dozen assumptions over which—as it seems now, in retrospect—our Viennese forerunners were too complacent. Two of the items requiring review, as a result, will be: (1) the very idea of a permanent "demarcation criterion" for telling real sciences from pseudosciences, and (2) the ways in which we draw the boundaries between the "normal," the "abnormal" (or "anomalous"), and finally the "paranormal" (or putatively mysterious). If the new approach is at all sound, we may expect to find that these distinctions have themselves to be drawn in historical and contextual terms. So, this article will discuss two topics: namely, the implications of this new approach, on the one hand, for defining any program and method for

inquiring into the claims of the paranormal and, on the other hand, for specifying the content of such a program.

Shifts in Demarcation Criteria

As to the first of these two questions, we should begin by reconsidering the meaning of the very term *normal* and its two parallel antonyms, *abnormal* and *paranormal*. Beforehand, we might be inclined to assume that the idea of *normality* must be a permanent item in the inventory of human thought; or that it is at the very least a necessary presupposition of modern science. Surely human beings (particularly, scientific investigators) have always had such a notion?

The slightest historical investigation reveals that this is not the case. The idea of the "normal," in its modern sense, is curiously recent, certainly far more recent than the rise of modern science. Other earlier notions (to be sure) are clearly cognate or ancestral to our own modern idea of normality. But the first use of the term *normal* in this sense recorded in the *Oxford English Dictionary* dates from the year 1840; as such, it coincides with the start of the professionalization of scientific work. Notice that 1840 was also the year when, in the course of his presidential address to the new British Association for the Advancement of Science, William Whewell introduced his freshly coined word to replace all those vague words and phrases hitherto used when referring to scientific students of natural phenomena—namely, "natural philosophers," "savants," "virtuosi," and the like—the brand new word, *scientist*, which Whewell invented on the model of the much older and better established word *artist*. (Sociologists will certainly see it as no accident that the rise of a professional class of "scientists" also coincided with fresh attempts to mark off the "normal" course of natural events from other, more surprising or mysterious phenomena.)

As to the contrary term, "abnormal," this turns out to be even more recent and ill defined. Indeed, this is one of the rare words for which the *O.E.D.* reserves a critical commentary. About "abnormal" it says, in what connoisseurs will recognize as fighting words, "Few words have shown such a series of pseudoetymological perversions"; and the earliest uses of the word in a recognizably modern sense date from around the 1860s and 1870s. (Not surprisingly, the word "paranormal" does not appear at all, either in the *O.E.D.* or in its supplements!)

During the two preceding centuries, scientists had spoken of exceptional or mysterious happenings and phenomena in different terms. For eighteenth-century natural philosophers, the operative contrast was that between the "natural" and the "unnatural," with the "supernatural" standing on one side (so to say) for emergency use only. For their seventeenth-century forerunners, the basic distinction was that between the "natural,"

on the one hand, and the "divine" or "miraculous," on the other. In framing his account of Nature, for instance, Isaac Newton took it for granted that the observed phenomena embrace both passive, natural processes and also the active interventions of Divine Agency; conversely, when Leibniz and the Cartesians criticized Newton's hypothesis of universal gravitation, they objected to it as being "either miraculous or imaginary."

Why was there this shift, around 1840, away from the ideas of Nature and the "natural" and toward those of the "normal," or "what is normally expected"? Aside from the beginnings of professionalization, at least two other factors need attention. For a start, from the 1830s, the Romantics had acquired something of a monopoly over "Nature," and as a result it was felt to have lost some of the precision it needed to be of use in science. In addition, this change was probably associated with the rise of the new "positivism" of Auguste Comte, which in turn acquired a special status among theoretical physicists and chemists, most of all in France.

In order to find out what is *natural,* all that one need do was to *look and see.* The "natural" is simply what we find to be natural as a matter of experience: before passing judgment about what is "possible" or "impossible," we must await the outcome of experience. (Pigs *don't* fly. Stick around them, and you will never see an airborne porker!) By contrast, we can decide what is "normal" beforehand only if we have built up a theoretical picture of relevant aspects of the natural world that is clear, definitive, and reliable enough to distinguish those things that "are normally to be expected" from those that can be believed in only by credulous and gullible people. The "normal" is thus what is theoretically intelligible: We have theoretical reasons for distinguishing the "conceivable" from the "inconceivable." (Pigs *can't* fly. You needn't waste time sticking around them, as the very idea of a porker taking off unaided is contrary to the laws of physics!)

Once we see how deeply the idea of the "normal," together with the contrary ideas of the "abnormal" and the "paranormal," is implicated with the current state of *theory,* we can recognize a serious problem. The content of scientific theories changes, sometimes drastically; so we may be tempted to rule out, as "inconceivable" and "paranormal," things that a later stage of science acknowledges as quite possible, or even actual. Thus we may unwittingly cross the line between skepticism and dogmatism, and so rule out of court phenomena and hypotheses that historical imagination should warn us not to dismiss. The task of drawing a line between what is and is not "theoretically conceivable," and so what is or is not "normal" (as contrasted with "paranormal" or "scientifically inconceivable"), has a long and complex history of its own; and if we only reflect on the course of that history, it will induce a certain modesty even about our skeptical doubts.

Sir Isaac Newton

Charles Darwin

History's Sobering Lessons

When we turn to the second of the topics we set ourselves to consider here, this point is only reinforced. When it comes to compiling a list of supposedly "paranormal" phenomena, which are rightly suspect today, we cannot afford to overlook those natural phenomena that we accept as quite natural, normal, and genuine today but which were dismissed in earlier times merely because, as yet, they had won no place in the accepted theories about the natural world. A short list of these is sobering.

The seventeenth-century mechanical materialists (for a start) could accept as "natural" constituents of the physical world only those material particles or corpuscles that were strictly passive. These were not themselves sources of motion, but they could be set in motion, either when they collided with similarly material particles or else (exceptionally) when they were acted on by "nonmaterial" agents. Interactions of the latter kind were not in themselves suspect. Although they were ruled out from the purely material (or physical) wing of Descartes's ontology, they had to be accepted as the means by which "mental action" alone could bring about physical effects. So, for instance, we find Giovanni Borelli's treatise *On Animal Motion* insisting that all of a living creature's muscles and bones are merely mechanical and that the ultimate source of its motion must be an immaterial but "vital" agency operating through the vehicle of its brain.

Newton, for his part, had no worries about admitting both passive

physical phenomena and active divine intervention into his overall picture of the world: Indeed, all the phenomena that were later attributed to "fields" Newton regarded as vehicles for divine intervention, and so attracted Leibniz's mockery of his reliance on "miracles." (In Leibniz's eyes, miracles could be tolerated in the realm of Grace, but they were not to be admitted into the realm of Nature.) As for the notion of a "thinking machine," that would have struck all the leading natural philosophers of the seventeenth-century as a *contradiction in terms.*

Over the 350 years between 1620 and 1970, in point of fact the meanings of the terms *matter* and *machine* have shifted quite drastically, and with them that of the correlative notion of an "immaterial entity" also. In the seventeenth century, "matter" was so defined that *thought* was, by definition, an immaterial thing; but so too were gravitational fields, electric currents, and even (on some accounts) gases. Only their successors in the eighteenth century, e.g., Julien de la Mettrie and Joseph Priestley, had the perception to see, and the courage to declare, that the seventeenth-century definition of "matter" had been arbitrary in the first place and that the resulting dualism was therefore unnecessary. For the time being, however, a seventeenth-century physical theorist would have been quite in order if he had looked at an electronic computer and said, "That's not what I mean by a machine at all!"

In the late eighteenth century, the topic of hypnotism aroused much of the suspicion and hostility that was to surround the topic of unconscious motivation a century later. In fact, Lavoisier undertook on behalf of the French Academie des Sciences an inquiry into the status of "animal magnetism," as hypnotism was then called. During the nineteenth century, likewise, the wave theory of light, cross-generic hybridization, and the molecular basis of genetics and morphogenesis were called into question; but the most suspect topic of all was, of course, Darwin's theory of evolution by variation and natural selection. Indeed, right up to the time of Darwin's death, there were those who believed that his theory was "inconsistent with physics"; and he himself was conscious enough of the force of their objections that he could meet them only with the hope that one day they would prove needless and "go away."

The basis of these objections was Darwin's estimate of the age of the earth and the length of time needed for the action of natural selection to produce the living creatures we know at the present time. On the best calculations of the time required for a spherical object the size of the earth to cool to a habitable temperature, according to Newton's Law of Cooling, it would be habitable for no more than 25 million years before becoming too cold to continue supporting life: At least, this was evidently the case if all the sources of the earth's heat were its initial high temperature and the solar radiation falling onto its surface. (In any case, as was pointed out by Lord Kelvin, the sun, too, must be cooling down in the same way and

Joseph J. Thomson

Max Planck

"could not" have remained at the required temperature for as long as Darwin needed.) So it was easy enough for Darwin's contemporaries to dismiss his views on the best available scientific grounds; and it took a man with the caution of Charles Lyell to see that the results of all these calculations held good only on the assumption that nineteenth-century physics already knew all the actual sources of the earth's heat. As it turned out, of course, it did not. And, since 1900, the extreme antiquity of the sun and the earth has been securely underpinned only with the discovery of two radioactive processes: nuclear fusion to maintain the sun's heat, and the inner sources of radioactivity within the earth to generate mountain building and provide the warmth needed to support life.

Yet even greater surprises were in store for orthodox physicists before the turn of the century. Max Planck's theory of quantization, introduced in 1899 in hope of saving James Maxwell's theory of electromagnetism from the "scandal" of the black body radiation spectrum, was greeted by many physicists as a major betrayal of established ideas. Worse still, J. J. Thomson's first paper in the *Proceedings* of the Cambridge Philosophical Society, reporting the discovery of minute negatively charged particles ("electrons") having a mass less than one-thousandth of the mass of a single hydrogen atom, was at first suspected of having been published as a hoax! After all, nineteenth-century atomism left no place for material units lighter than a single hydrogen atom; so (it was assumed) one *knew* that no such smaller particles could conceivably exist. It would be hard to illustrate more elegantly the alliance between skepticism and dogmatism.

The Blurred Periphery

To say this is not to argue for any fashionable "relativism to the current paradigm": Appeals to "paradigm switches" can, in any case, too easily be used to snow the gullible. Still less is it to call into question the general program of investigating, in a critical and skeptical spirit, the claims made on behalf of the "paranormal" today. It is to argue only that we need to be discriminating, even in the reach of our own skepticism. As we can now see in retrospect, some of our predecessors, e.g., the founders of the Society for Psychical Research in the nineteenth century, worked with ideas that were naive and dogmatic in just the sorts of ways we most need to avoid. We are right to recoil from the chance of being gulled; but, in doing, so, we must take care not to recoil so far that we put ourselves in the same camp as (say) the critics of J. J. Thomson. We can hope to find out what the proper scope of our doubts should be only in the same way that we discover other scientific truths, that is, *as we go along.*

At any stage in the development of science, there is a point beyond which we cannot know for certain *exactly* what it is that we do and do not understand and *exactly* where a line should be drawn between phenomena that are as yet mysterious and happenings that are frankly incredible. This is not to say that the changes we must look for, in this respect, will be so drastic as to wipe out all our current boundaries and distinctions. Some common core of understanding may be expected to survive all the future changes in scientific theory, just as Newton's ideas survive in our own quite different intellectual context. Still, at the edges, the periphery will always remain blurred; and, in the future as in the past, as our scientific understanding is still further refined, that blurred boundary will sometimes come into sharper focus in quite unexpected ways.

For the moment, the world of the paranormal embraces enough plainly unscrupulous quackery and exploitation to keep us fully occupied. Whether we concentrate on finding alternative ways of accounting for the supposedly *non*-normal features of all these things, or whether we focus rather on the sociological factors and political motives involved in such situations, there is lots to keep us busy. That being so, we shall do well if we try to avoid wasting our fire on marginal and questionable targets. •

An Eye-Opening Double Encounter

Does a scientific reputation guarantee objectivity toward paranormal reports?

Bruce Martin

AS A GRADUATE of Northwestern University, I retain a deep respect for its faculty. Some years ago I learned that a retired Northwestern professor and director of its Dearborn Observatory, J. Allen Hynek, had endorsed several purported UFO sightings. That a former Northwestern astronomy professor could accept the sightings as UFOs made me think that there might be some validity to such reports.

A reported UFO sighting in Charlottesville, Virginia, two years ago has been strongly supported by Hynek. I have lived in the area for the past 25 years and thus have had an opportunity both to follow this UFO claim and to observe Hynek's handling of it. My experience in this eye-opening double encounter may interest those who have also wondered about Hynek's role in UFOlogy.

On Friday, April 2, 1982, the Charlottesville afternoon paper, the *Daily Progress,* displayed a front-page story about a UFO sighting by Nannette Morrison on the previous Tuesday, March 30. The article featured a picture of Morrison pointing to the sky where reportedly the UFO hovered. Morrison observed the UFO at about 11:30 P.M. while returning home. She claimed that the object paced her car and then hovered overhead. Even though she turned off her car radio, Morrison could not hear anything. Based on the description in the newspaper account of the streets traveled and allowing time for Morrison to go inside to get her mother, the whole event would have lasted a few minutes.

In response to this article, on April 14, 1982, the *Daily Progress* carried a letter to the editor by a Charlottesville resident, Jimmy Smith,

Bruce Martin is professor of chemistry at the University of Virginia.

That Flying Object May Have Been a 737

I read with interest the story that a UFO had been sighted over Charlottesville ("Mother, Daughter Claim UFO Sighted." The Daily Progress, April 2). I believe that Ms. Nannettee Morrison and her mother saw something, but I do not believe that what she saw was a UFO.

On the same night, my three brothers and I were outside at approximately the same time that Ms. Morrison says she saw something. We live on Rt. 20 North, and we are on the landing and take-off pattern for big passenger planes from the Charlottesville-Albemarle Airport. At about 11:30 we saw a large jet come in from the east, then turn north. It was almost directly above us as it passed over.

This plane was unusual in that it had a large number of brilliant white lights on it. It was going very slow, it was barely making any noise, and it was quite low. It was so brightly lit that it looked like a flying Christmas tree. I told my brothers that it must be in trouble because of the number of lights that were on. We have lived here all our lives, and we have never seen a passenger plane lit up like this one — and we have seen many planes come and go at night.

Sections of both wings had several bright, white lights illuminating them, and there were two bright headlights. There also were white lights shining upwards from the base of the tail, like flood-lights, shining against the vertical part. If we had not seen that it had portions of the wings illuminated, I suppose it could have been mistaken for something else. We could also see faint

have seen the same... saw, only at a different angle... cause of the lights on the wings, they looked like they were in sections (portions of the wings weren't visible).

Several times, while driving, I have noticed planes that looked like they were pacing my car. Sometimes they appear to be just hanging there in the air and not moving. My brothers and I also noticed that the plane that night made a turn and after it did so, the lights were all lined up, and it showed as one large white light.

We know what we saw was a big passenger jet, possibly a 737. But it would have been confusing had the plane not been so close overhead, and if we had not seen the wing portions from underneath.

Jimmy Smith
Charlottesville

A Piedmont Airlines official told The Daily Progress that a 737 landed at the Charlottesville-Albemarle Airport at about 11:45 p.m. on the night in question.

Progress Phot

TE MORRISON POINTS TO SKY
UFO Hovered There Tuesday Night

Mother, Daughter Claim UFO Sighted

The original article and the Smith letter attributing sighting to a landing 737 airliner.

stating that he and his brothers had seen a brightly lighted object at about the same time on the same night and identified it as a passenger jet, possibly a 737. According to the local airport authorities, a 737 did land about 11:45 P.M. In his letter Smith stated that they could not hear the engines until after the plane passed over. In a thoughtful final two paragraphs Smith also mentioned that while driving he had noticed several times that planes looked as though they were pacing his car. At other times the planes just appeared to hang in the air and not move. (Depending upon their angle of approach, this has also been my experience: planes sometimes appear to move very slowly or to be motionless, and little or no noise is heard until they have passed.)

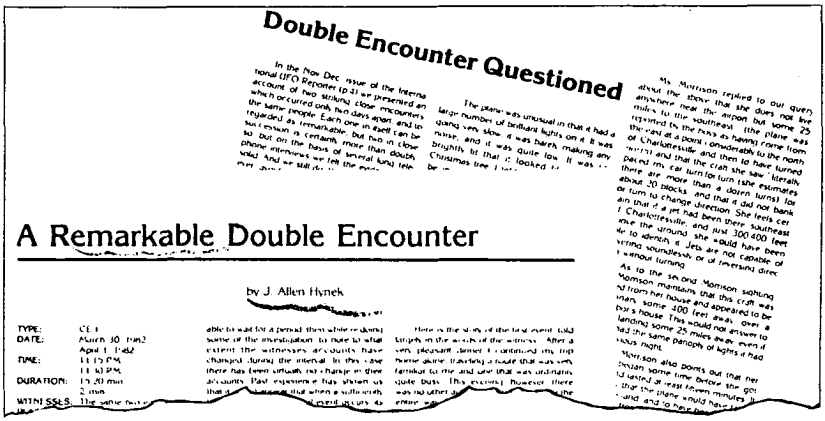
A year and a half later, on November 19, 1983, during the "Conference on the Psychic" at the local library, Nannette Morrison delivered a talk billed as "Psychic Investigator will relate the psychic phenomena to the UFO experience." She gave an expanded version of the newspaper account, adding a second sighting, on April 1, 1982. Her talk also described encounters with extraterrestrials by others, such as the "Andreasson affair" and the abduction of Betty and Barney Hill. Morrison added that in abductions extraterrestrials are especially interested in human reproductive organs and have been known to insert a sharp needle into the human navel. Morrison also described six manifestations of UFOs and psychics.

To me, however, the most startling part of Morrison's talk was her use of Hynek's name to legitimize her claims. She said Hynek had talked to her for more than an hour by phone; he had asked if she had seen figures or had mental telepathy with the UFO occupants. She also stated that Hynek had said that only certain people are chosen to see UFOs.

I found the views attributed to Hynek astonishing. Therefore, in late November 1983, I wrote Hynek a letter enclosing copies of both the original Morrison article from the front page of the local paper and the Jimmy Smith letter. I also cited the conference and told Hynek that Morrison spoke of him frequently. I specifically asked Hynek his opinion of abduction claims and if it is his view that only certain people are chosen to see UFOs. Hynek never replied.

Meanwhile, in the November/December 1983 issue of Hynek's *International UFO Reporter,* there appeared a three-page article written by Hynek entitled "A Remarkable Double Encounter," in which both Morrison sightings are discussed. The account is essentially that given by Morrison at the November 1983 conference. Since the second encounter, which took place two days after the first, occurred a half-hour after Hynek had finished an hour-long interview with Morrison, he opened by stating that this is the closest he had come to a CE-1 event. In his version the first encounter lasted 15 to 20 minutes. The second encounter two nights later, on April 1, 1982, also at about 11:30 P.M., lasted only 2 minutes. Morrison was inside her house and felt drawn to the window, where she again saw a bright, hovering UFO. She again called her mother, who also saw it, whereupon it zipped away at incredible speed. In his analysis of the pair of encounters, Hynek declares that they argue strongly against a natural event.

To my surprise there appeared in the March/April 1984 issue of the *International UFO Reporter* a one-page comment entitled, "Double Encounter Questioned," which cites me for calling Hynek's attention to the Jimmy Smith letter (mistakenly assigned by Hynek as April 2, rather than April 14, 1982). Early sections of the Jimmy Smith letter are quoted but not the final two paragraphs referred to above. Hynek begins the comment by stating that, though he feels the evidence for the encounters is



Double Encounter Questioned

A Remarkable Double Encounter

by J. Allen Hynek

The articles in *International UFO Reporter.*

"solid," he never "swept under the carpet logical counter views." He resists (as he says) jumping to the conclusion that just because the time of the sighting and the plane's flight were similar the sighting has been solved. He reports Morrison's reply, "that she does not live anywhere near the airport but some 25 miles to the southeast." She also repeated that the UFO paced her car turn for turn for about 20 blocks and that it did not bank or change direction. Since jets are not capable of hovering soundlessly or of reversing direction without turning, and because it is unlikely that a plane would fly so low so far from the airport, Hynek concludes that Morrison's reply is convincing.

Inspection of the U.S. Geological Survey map shows, however, that Morrison's home is not southeast but mainly south and slightly west of the airport. Moreover, her home is but 5.3 miles from the airport runway, which points in the direction of her house. Even by automobile the distance to the airport is only 8 miles. Morrison's estimate of 25 miles would take one far past the airport and one-quarter of the way to suburban Washington. These contradictions of Morrison's report are critical because they account for the low altitude of the plane. Morrison's house lies under an airport landing pattern. As one of her neighbors said to me, "We see that UFO every night." Evidently the parts of the Morrison UFO sightings that are not imagination may be attributed to jets that happened to come in for a landing at a certain angle as well as the difficulty even experienced observers have in estimating distances to lighted objects in the night sky. Whether Morrison passes as an acute observer of objects in the night sky is not, however, the main point of this article.

As a leading investigator of UFO phenomena, former astronomy professor J. Allen Hynek brings to the subject the prestige of studied, objective scientific judgment. In this case of a purported double encounter,

which he himself describes as remarkable, what are Hynek's standards of judgment? No trip to Charlottesville is reported, only phone calls to the witness. Evidently he made no check even of regularly scheduled commercial flights, which would have suggested that a plane was in the area at the time of the sightings. A check of maps that ought to be available to Hynek would have revealed that Morrison lives on the north side of town, only 5.3 miles from an airport runway that is aligned with her house. The experiences of neighbors whose homes also lie under the landing pattern are not solicited. In a university town with 16,000 students and an area population approaching 100,000, he does not ask why no one else reported spotting either of the two UFOs. Instead, Hynek rejects the reasonable interpretation of Jimmy Smith in favor of a presumed extraterrestrial craft encounter. It is difficult to detect what if any objective standards Hynek applied to this case.

Finally, what does this case reveal about the present critical mentality of J. Allen Hynek, former astronomy professor? It is discouraging to see someone who has practiced as a scientist, and presumably applied an objective, analytical attitude to his own professional work, take up a subject so much in the public mind as UFOs and apply what seem like no standards whatever. Hynek appears to be but another sad case in which the mania for the occult has overwhelmed critical judgment and submerged the practice of meticulous checking and rechecking of evidence that every reliable scientist observes. •

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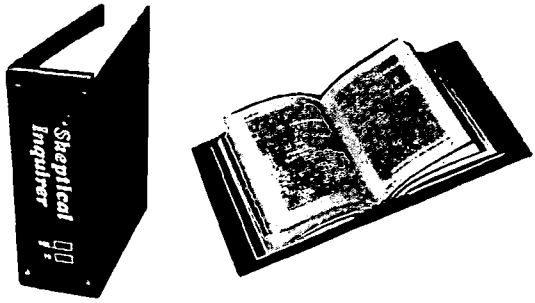

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Natural Levels of Similarities Between Identical Twins and Between Unrelated People

How likely is it for any two people of roughly the same age and sex to find unusual-seeming similarities?

W. Joseph Wyatt, Anne Posey, William Welker, and Carla Seamonds

IN HIS BOOK *Twins: An Uncanny Relationship?* Peter Watson (1982) statistically analyzed the unusual similarities between identical twins and concluded: "To date, there is no evidence whatsoever to support the idea that any form of parapsychological phenomena are involved in the twin bond" (p. 200).

Yet startling similarities, particularly between identical twins separated soon after birth and reared apart, are invoked at times as evidence for a number of paranormal events, including astrology (because twins are conceived and born at the same time) and telepathy (because twins have reported similar insights, ideas, and activities). These sensationalized reports ignore the possibility that identical genetic structure may exert similar, if not identical, control over behavior. Similar environments could also account for the amazing similarities, because, as Susan Farber (1981) has shown, less than 10 percent of the separated identical twins described in the scientific literature have been *completely* separated. Many were placed with relatives or in homes with similar socioeconomic standing.

Aside from the genetic and environmental variables, another interpretation is that the identical-twin similarities may not be as unusual as they seem. Given the almost limitless number of ways in which humans can act, think, and feel, perhaps any two people of the same age and sex have a good deal in common. This would be particularly true if they had been raised in the same culture, however broadly defined. To date there is a paucity of data for use as a baseline to evaluate the significance of similari-

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ties between identical twins.

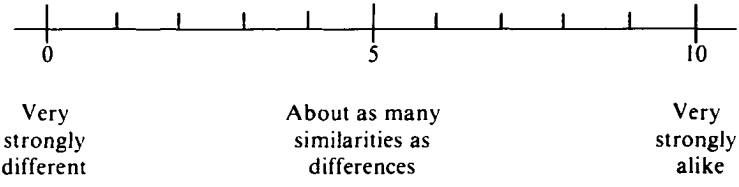
The present study was designed to determine the naturally occurring level of similarity between unrelated people and to use that level of similarity as a baseline for evaluating the significance of the similarities between 13 sets of identical twins.

Method

Subjects. Serving as participants were 13 pairs of identical twins ranging in age from 15 to 22. The twins were all students in high school or college. Also participating were 25 pairs of unrelated individuals recruited from college classes.

Assessment Devices. The 16-PF Test is a standard paper-and-pencil test of 16 personality factors. The subject obtains a score from 1 to 10 on each factor. Examples of the factors, which are really bi-polar dimensions, include: reserved vs. warmhearted, sober vs. happy-go-lucky, humble vs. assertive, and tough-minded vs. tender-minded. The correlation between a pair of subjects' scores is an indication of the similarity between the pair, at least for the 16 factors measured.

A second assessment device, the Dimensions Alike and Different Scale (DADS), was constructed especially for this study. It consists of a list of 41 areas of functioning, including political beliefs, musical interests, religious preferences, jobs held, hobbies, favorite foods, and so on. It requires a pair of participants to briefly talk over each area of functioning and then, working together, estimate the degree of similarity or difference between them on the following scale:



Thus each pair of twins gave themselves 41 ratings, as did each pair of unrelated participants. The mean rating across all 41 areas of functioning is a global measure of the similarity between each pair of participants.

Procedure. Each pair of identical twins completed the 16-PF test individually and then, working together, rated the degree of similarity or difference between them on each of the 41 items of the Dimensions Alike and Different Scale. They were not told the rationale for the study except that it was to discover some of the ways that people are alike and different.

The unrelated individuals followed the same procedures. When paired,

care was taken that they were of the same sex and roughly the same age. This ensured that age and sex differences could not influence the results for the unrelated pairs, making their data comparable in meaning to the data of the identical twins (who are always the same sex and age).

Results and Discussion

On both the DADS and the 16-PF test identical twins were found to be more alike than randomly paired individuals. The 13 twin pairs' mean DADS rating of 7.94 was significantly greater than the 25 random pairs' mean rating of 6.46 (t = - 3.95 (24, 12), $p < .001$). Correlations on the 16-PF test averaged .47 for identical twins, compared with .14 for unrelated people (t = - 3.32, $p < .001$). These differences are not surprising considering that our identical twins were reared together.

Aside from the greater general similarity between identical twins, inspection of individual scores in Table 1 revealed an interesting tendency in the unrelated pairs: They tended to see themselves as more alike than different. This may have been because they were indeed more alike than different (being roughly the same age and the same sex) or because it was more interesting for them to identify similarities. Most unrelated pairs rated themselves as more alike than different on both the DADS and the 16-PF Test. Some unrelated pairs saw themselves as highly similar and none felt that they were really quite different. These data support the notion that we must be skeptical of claims about paranormal causes of similarities between identical twins (even those reared apart) because similarities are quite common, even among unrelated individuals.

Thus the population's naturally occurring level of similarity must be taken into account in any evaluation of the subset of identical twins. Our data strongly suggest that it is relatively easy for almost any two people of roughly the same age and sex to find similarities that may seem unusual. For example, one of our *unrelated* pairs of women shared these characteristics: Both are Baptist; volleyball and tennis are their favorite sports; their favorite subjects in school were English and Math (and both listed shorthand as their least favorite); both are studying nursing; and both prefer vacations at historical places. Had these similarities been found in a pair of identical twins (who had been reared apart) they might have been used as evidence for astrology, ESP, and the like.

Another issue is the level of analysis used to determine whether a similarity exists. A biased researcher might tend to use the most convenient level of analysis. For example, one of our twin pairs indicated that, although both drove Fords, they viewed themselves as having quite different preferences in automobiles, one driving the larger and more conventional LTD, the other a Thunderbird. Experimenters biased in the direction of confirming the paranormal could have stopped at the first

TABLE 1

Mean of Each Pair's DADS Ratings
and Correlation of Each Pair's 16-PF Scores

DADS Ratings		16-PF Scores	
Random Pairs (n = 25)	Identical Twins (n = 13)	Random Pairs (n = 25)	Identical Twins (n = 13)
8.6	9.5	.57	.74
8.1	9.2	.55	.65
7.9	8.7	.55	.61
7.4	8.5	.52	.60
7.4	8.4	.42	.52
7.3	8.2	.42	.50
7.3	8.2	.36	.50
7.1	8.2	.22	.43
6.7	7.7	.16	.42
6.6	7.4	.14	.40
6.6	6.9	.13	.37
6.5	6.8	.12	.27
6.4	5.5	.12	.06
6.3		.09	
6.2		.08	
6.2		.05	
6.0		.02	
6.0		-.02	
5.9		-.05	
5.8		-.06	
5.6		-.09	
5.4		-.12	
5.2		-.18	
4.6		-.20	
4.3		-.23	
M 6.46	7.94	.14	.47
SD 1.04	1.08	.25	.18

M = Mean
SD = Standard Deviation

level of analysis, neglecting crucial differences between the twins.

Researchers interested in documenting the paranormal would do well to specify the level of twin similarity that would allow plausible inferences

to begin. Speculation about evidence for astrology, ESP, and such, is premature and unwarranted until the level of twin similarity is shown to be above that contributed by genetics, environment, and the natural level of similarity between people.

Acknowledgments

We thank Vernon R. Padgett, Steven Cody, Donald Chezik, and Stuart Thomas for their help in preparing this manuscript.

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Note

Reprints may be obtained from the first author at the Department of Psychology, Marshall University, Huntington, WV 25701.

Evidence for the Effectiveness of a Reading Program in Changing Beliefs in the Paranormal

Paul J. Woods

AFTER CONDUCTING a survey among our student body, I was sufficiently distressed by the prevalence of beliefs in the paranormal to bring my results to the attention of our Academic Policy Committee and subsequently to the College Legislature. I thought it appalling, for example, that only 37 percent of our seniors were willing to actually state that they did not believe in ghosts (26 percent said they were not sure about ghosts, and the remaining 37 percent said they believed in them). It was also distressful to me that 64 percent of the students said they believed in mental telepathy, that only 31 percent rejected precognition, that only 38 percent rejected reincarnation, and that 46 percent believed that you could make plants grow better by talking to them. I was astonished that such beliefs, many characteristic of medieval thinking, were commonly held by intelligent, well-educated persons. However, no one publicly shared my concern. In fact, remarks made on the floor of the College Legislature either made light of my concern or actually ridiculed it. I am told I was even the object of an angry attack in one committee meeting.

As a result of all of this I decided to pursue my own quiet campaign, and I offered a course during our between-semesters independent-study period—a four-week "short term." The course was entitled "The Scientific Investigation of Claims of the Paranormal," and it attracted over 50 percent more students than the upper limit of 20 usually allowed in such courses.

As a basic text we used an excellent new book by Zusne and Jones, *Anomalistic Psychology: A Study of Extraordinary Phenomena of Behavior and Experience.* And as supplementary reading we made available the SKEPTICAL INQUIRER and such books as *Parapsychology: Science or Magic?* by James Alcock; *Paranormal Borderlands of Science,* edited by Kendrick Frazier; *The Psychology of the Psychic,* by Marks and

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TABLE 1
Illustrative Changes in Students' Belief in the Paranormal

	Before course %	After course %
I firmly believe that ghosts and spirits do exist.		
Agree	55.2	19.3
Undecided or Don't know	27.6	32.3
Disagree	17.2	48.4
I believe psychic phenomena are real and should become a part of psychology and be studied scientifically.		
Agree	41.4	12.9
Undecided or Don't know	41.4	16.1
Disagree	17.2	71.0
Through psychic individuals it is possible to communicate with the dead.		
Agree	24.1	0.0
Undecided or Don't know	41.4	16.1
Disagree	34.5	83.9
I believe that many special persons throughout the world have the ability to predict the future.		
Agree	31.0	16.2
Undecided or Don't know	41.4	6.5
Disagree	27.5	77.4

Kammann; *Science and Unreason,* by Radner and Radner; *Occult and Supernatural Phenomena,* by Rawcliffe; and *The Roving Mind,* by Isaac Asimov.

Students contracted to work 30 hours a week on reading, group projects, discussions, interviewing, etc. The class met three times a week, but there was not a great deal of lecturing. I did talk on such matters as scientific rules of evidence, parsimony, and open-minded skepticism in general. In particular, caution against blindly believing printed reports was encouraged (see, for example, Dennett 1981). The rest of the class sessions consisted mostly of reports from small study and discussion groups that were formed within the class. And there were some demonstrations. We showed with an electromyograph, for example, that whenever the pointer

I am firmly convinced that reincarnation has been occurring throughout history and that it will continue to occur.		
Agree	17.2	3.2
Undecided or Don't know	44.8	35.5
Disagree	37.9	61.3
ESP is an unusual gift that many persons have and should not be confused with the elaborate tricks used by entertainers.		
Agree	44.8	16.1
Undecided or Don't know	34.5	16.1
Disagree	20.6	67.8
With proper training anyone could learn to read other people's minds.		
Agree	13.7	0.0
Undecided or Don't know	24.1	12.9
Disagree	62.1	87.1
Plants can sense the feelings of humans through a form of ESP.		
Agree	13.7	3.2
Undecided or Don't know	37.9	19.4
Disagree	48.2	77.4

on a Ouija board was moving there was heightened activity in the participant's anterior deltoid muscle.

The effectiveness of this educational experience can be attested to by changes in the students' beliefs in the paranormal. We used the Belief-in-the-Paranormal Scale before and after the course (Tobacyk 1983). Overall scores on the test changed from an average of 71.4 before the course to 51.0 at the end. This represents a highly significant decline in strength of the students' beliefs in the paranormal ($t(27) = 7.42$, $p < .001$). This decline occurred for *every* student in the class except two whose scores remained the same, and one of those two had had the lowest score possible before the course.

Changes in attitudes to particular phenomena are of interest. Follow-

ing are the results of some of the individual items from the Belief-in-the-Paranormal Scale.

Such a reading course could be incorporated in the curriculum in any college or university without much faculty effort. It could be offered, for example, merely as an independent study. From the point of view that regards critical thinking as a positive value, the benefits to be derived are well worth the small effort involved.

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Pseudoscientific Beliefs of Sixth-Grade Students in the Charleston, S.C., Area

Aaron S. Adelman and Saul J. Adelman

THE SKEPTICAL INQUIRER has published several reports on pseudoscientific beliefs in college students and adults (see, e.g., "Reduction in Paranormal Belief . . . ," by Jerome J. Tobacyk, Fall 1983, pp. 57-61). But such beliefs develop at younger ages. Children today are subject to influences somewhat different from those of even a generation ago. By studying children we may gain some insight into their future attitudes as adults.

South Carolina spends less per capita than virtually any other state for elementary and secondary education. Many middle- and upper-class South Carolinians send their children to private schools. These children typically receive their first significant school exposure to science in the sixth grade, which marks the beginning of middle school.

This study was begun as a sixth-grade science project. A survey was formulated that included 16 statements chosen from topics covered in the SKEPTICAL INQUIRER. Five of the statements were written in the negative. Each student was asked to circle "Agree," "Don't know," or Disagree" after each statement. A score of 1 was given to the nonscientific response, 2 to "Don't know," and 3 to the scientific response. The students were told that the only correct answers were their own honest answers. Questionnaires where the students circled the same type of answer, e.g. "Agree," to all 16 statements were considered invalid and were not used in this analysis.

The questionnaires were administered to students at four schools in January 1984. Charleston Middle School (CMS) (a pseudo-name) is a public middle school in the Charleston County school system. Its school district is middle class with some lower-class families. Allen Cooper School (ACS) (a pseudo-name) is a well-respected private school in South Carolina. Its students are predominantly upper middle class. It has a Protestant religious affiliation. A Baptist School (ABS) (a pseudo-name)

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TABLE I

Summary of Responses

	School			
	AHA	ACS	ABS	CMS
Average of all responses	2.47 (n = 20)	2.37 (n = 46)	2.34 (n = 24)	2.26 (n = 50)
Statement	Average*			
1. Witches and warlocks (male witches) exist.	2.85	2.70	2.83	2.70
2. Large buildings, such as the pyramids in Egypt, were built by aliens from other planets	2.70	2.87	2.83	2.76
3. The Loch Ness monster of Scotland does not exist.	2.05	2.06	1.92	1.96
4. Through special people it is possible to talk with dead people.	2.70	2.48	2.54	2.42
5. Once a person dies his spirit may come back from time to time in the form of a ghost.	2.20	2.26	1.96	2.20
6. Some people are able to lift objects through mysterious mental forces.	2.35	2.33	2.12	1.98

*Average score on a scale of 1 to 3 (1 = "Agree," 2 = "Don't Know," 3 = "Disagree").

draws its students from families who want an education with a strong religious orientation for their children. About one-half of the Jewish students in the Charleston area attend Addleston Hebrew Academy (AHA). The religious orientation is Orthodox Judaism, although most of the students come from less observant families.

Table I shows the statements and the average responses for each of the four schools. The students were in the sixth grade (except for eight seventh-grade students at AHA who were included to obtain somewhat better statistics). Valid questionnaires were obtained from 50 students at CMS (27 boys and 23 girls), 46 students at ACS (35 boys and 11 girls), 24 students at ABS (all boys), and 20 students at AHA (12 boys and 8 girls). Five questionnaires were classified as invalid. As the students were mostly white and of similar economic background, we decided to consider dif-

7. Some people are able to tell the future by reading the palms of the hands.	2.75	2.44	2.58	2.18
8. Reincarnation of the soul has been occurring throughout history and will continue to occur.	1.44	1.24	1.36	1.18
9. You should consult your horoscope daily.	2.25	2.11	2.17	2.08
10. Miracles that cannot be explained by science happen all the time.	1.80	1.78	1.67	1.96
11. People with special powers can change their forms.	2.90	2.74	2.62	2.62
12. Pyramids have no magical powers.	2.70	2.39	2.54	2.28
13. There is no scientific proof that intelligent aliens (people) from other planets have visited the earth.	2.30	2.17	2.21	2.24
14. Ghosts or spirits do not exist.	2.15	2.20	1.71	2.06
15. Through the use of mysterious formulas and chanting it is possible to cast spells on people.	2.70	2.50	2.71	2.18
16. With proper training anyone can learn to read other people's minds.	2.55	2.54	2.54	2.38

ferences in response according to which school the students attended as well as between boys and girls at the same school.

The boys and girls at the three coed schools constituted a single population of belief according to Student's *t*-tests on the average responses. The average values showed that the AHA students had the most scientific responses, followed by the ACS, ABS, and CMS students, in that order. But the differences between school averages were found not to be significant by Student's *t*-test. Still, some of the differences in average response between questions for each school population were significant. The level of significance depends on the number and distribution of responses. The following differences in average response assure significance, but in some cases smaller differences also could be significant: 0.60 for AHA, 0.35 for ACS, 0.50 for ABS, and 0.32 for CMS.

Statements 1, 2, and 11 evoked the most scientific responses, namely, that witches and warlocks do not exist, that the pyramids were not built by aliens, and that people with the power to change form do not exist. Questions 3, 10, and 14 showed the least scientific responses, namely, that there is uncertainty about the existence of the Loch Ness monster, that miracles that cannot be explained by science possibly happen all the time, and that ghosts or spirits may exist.

After this survey was distributed, we learned that many South Carolinians make a distinction between ghosts and spirits. This may help to explain the slight difference in response between statements 5 and 14. Responses to statements about specific types of miracles may show religious differences, e.g., miraculous cures vs. religious visions. Responses to 4 (communication with the dead), 7 (palm-reading), 12 (pyramid power), 15 (spells), and 16 (ESP training) show a strong tendency toward scientific attitudes. The remaining statements, 6 (mysterious mental forces), 8 (reincarnation of the soul), 9 (astrology), and 13 (alien visitations) show some tendency toward skepticism.

The degree to which pseudoscientific views are held thus depends on the aspect in question. The children who answered this survey appear on the whole to be at least indifferent to the aspects of pseudoscience under consideration. But they are not necessarily representative of the sixth-grade population in Charleston County because they may well be above average.

Be this as it may, there are disturbing significant shifts in belief in the data for all schools. The relative acceptance in children who have been exposed in principle to what is science, especially of the Loch Ness monster, ghosts, mysterious mental forces, astrology, miracles, and alien visitations, is of concern not only to scientists but also to religious teachers. Unfortunately, such topics are almost never discussed by so-called science textbooks at this level.

There are many issues that this study did not or could not address. The students who participated appeared willing to answer a somewhat longer and more detailed questionnaire. To study differences in attitudes toward pseudoscience among religious and racial groups requires a larger sample than we obtained.

The results of this survey were somewhat of a surprise to the adults involved. For the students who participated, the questionnaire caused a fair amount of self-examination, which otherwise would not have occurred. This suggests that creative teachers could use similar questionnaires as a means of stimulating critical thinking.

Acknowledgment

We thank the principals, teachers, and students who made this study possible.

Book Reviews

The Flaws in a Case

The Psychic Detectives. By Colin Wilson. Pan Books Ltd., Cavaye Pl., London SW109PG, 1984. 288 pp. £2.50.

Chelsea A. Manchester

IF WE ARE NOT scientists or particularly well versed in past debunkings of the paranormal, how do we go about evaluating a particular book on the subject? It seems to me that one may, in this situation, apply logic and the normal guidelines for proving a legal case—i.e., the rules of evidence—to arrive at a fair assessment.

I picked up a copy of *The Psychic Detectives* by Colin Wilson, never having read any of the author's other work, for research in connection with the mystery novel I am writing. As I had hoped, it proved to be an overview of various psychic detectives and their work/manifestations. As such, the book is likely to be useful to those who want to familiarize themselves with the field without ploughing through what sound, from Wilson's statements, to be rather lengthy originals. If, however, Mr. Wilson regards it as a "case" for the existence of psychometry/clairvoyance/telepathy, etc., then it seems to me that in a court of law the case would be dismissed.

The most serious flaw is that all the evidence presented is *hearsay*—often second- and third-hand. Mr. Wilson again and again draws our attention to the wondrous qualities of the phenomena he reports by saying such things as "If she did not know, as she claimed" but seems then to assume what he's trying to prove.

The book is not, overall, well documented. On page 197, for example, he quotes Carl Jung as saying: "The authenticity of this phenomenon can no longer be disputed today. I have found by experience that telepathy does, in fact, influence dreams, as has been asserted since ancient times." I have read some of Jung's

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Chelsea Manchester is a mystery writer living in Ireland. Her next book is The Bent-Spoon Mystery.

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work, found it admirable and personally enormously helpful. Therefore, I want to know where and in what context Jung said that; there is no reference cited. This is one example of hundreds.

Wilson's logic is frequently faulty: On pages 180-81 he presents an explanation of why dowsing works. The explanation is based on the idea that the unconscious prompts you to the right answer by tensing your muscles (and making your dowsing rods react). Unfortunately, he makes a false identification between (hearsay) experiments performed on split-brain patients with lights flashed in their eyes (and therefore actually seen) and underground water (actually *un*seen). The explanation resembles nothing so much as the kind of doubletalk one finds in science fiction when authors attempt to justify their settings; to be fair to science-fiction writers, this explanation would be considered very poor quality in the field. In addition, his reasoning processes are frequently poor. On page 210, for example, he accepts reasoning from the specific to the general: He quotes an experiment done with a pendulum in which one instance was accepted as showing the rule. Apart from whether or not the experiment has any validity of any other kind, it is clear that both the experimenter and the reporter are making unwarranted assumptions.

Psychologically speaking, it seems that the less one accepts one's own capacity for "evil" (lying, fraud, willful deception, etc.) the less is one's insight into the "evil" practiced by others. Mr. Wilson seems to be entirely unaware of human fraud. He seems to have no idea that it is possible for someone to enlist a confederate, or that it is possible for someone to put a great deal of time and effort into perpetrating a hoax. This involves denial of a great deal of documented history. For example, on page 221, he says, ". . . Cayce continued to add fragments to his story of Atlantis, and all have remarkable internal consistency—considering that they were produced over the course of decades." My acquaintance with the Narnia books of C. S. Lewis and Tolkien's Middle Earth, to mention two out of scores, suggests that it is within normal human ability to continue constructing, enlarging, and detailing imaginary countries over decades with remarkable internal consistency. Wilson further says, on page 245: "It is also observable that a large number of clairvoyants have had lonely and unhappy childhoods. They feel themselves to be misfits, outsiders." Surely this is exactly the kind of background to which psychologists have for years attributed all kinds of attention-getting behavior.

What is most fascinating is that he is in fact aware of the gaping holes in his argument and attributes them to the nature of the field he is studying. Thus: "Once again, we have to face the frustrating recognition that no theory of the paranormal seems to be able to accommodate *all* the facts" (p. 183)—which surely indicates a serious flaw in the theory and a necessity to begin again from scratch. And: "But the facts about the paranormal have a habit of refusing to conform to common sense" (p. 159). Or: ". . . cases of psychic detection . . . seem to be subject to the frustrating law formulated by William James: that no case involving the paranormal should ever be *wholly* convincing" (p. 251). And yet he is convinced, and expects us to be so, too. It is interesting to note that he criticizes Lyall Watson (pp. 15-17) for fictional embellishment of his paranormal reporting and finishes by saying that Watson indicated to him in a letter ". . . his recognition that it is almost impossible to remain open-minded *and* rigidly 'scientific' " (p. 17).

In a postscript, Wilson attempts to draw together the mass of material into a coherent hypothesis in the face of criticism. "Most of the cases can be criticized; but when they are taken as whole, a perfectly clear and consistent pattern emerges" (p. 276). I agree with Wilson that the *pattern* is more important than individual criticisms; unfortunately, the pattern I see is that *they can all be criticized.* He also says (p. 273), "When the same phenomena occur again and again, they must be genuine." Why? Fraud is surely a phenomenon, and it has occurred again and again; by reasoning, I suppose, fraud is genuine, or at least fraud is a genuine phenomenon, which no one disputes.

Wilson indicates in his introduction that his intention is "to state the facts about psychometry. . . . The aim is to lay out as much of the evidence as I can so that it can be seen and assessed" (p. 21). Human beings are capable of astonishing things; some of them boggle the imagination. (I personally find automobiles, computers, well-written mystery novels, paintings, and other such creations genuine marvels.) I am more than willing to believe that we have not even begun to find out what human beings are capable of, but I am not willing to accept the evidence presented in this book as proof of these particular wonders.

I do agree with Wilson that it is important in critiquing work in this, or any, field to avoid name-calling, intolerance, paranoia (in this case, the assumption that the critics are of necessity hostile), and simple bad temper. It merely makes the critics, whether skeptics, rationalists, genuine researchers, or parapsychologists, sound like fools. It only damages whatever case you are trying to present. •

A Psychohistory of UFOs

Flying Saucers: Magic in the Skies. By Otto Billig. Schenkman Publishing Company Inc., 3 Mount Auburn Pl., Cambridge, MA 02138. 1982. 237 pp., cloth $16.95, paper $9.95.

Michael R. Dennett

IN MARCH 1978, a Gallup poll revealed that 57 percent of the American public believed in the existence of UFOs. Perhaps more interesting was the fact that 66 percent of the people with college backgrounds believed in UFOs, a higher percentage than for the population as a whole. Otto Billig feels that these figures show that flying saucers are a significant social phenomenon. *Flying Saucers: Magic in the Skies* looks at the UFO enigma as it affects our civilization.

Billig, a psychiatrist at Vanderbilt University School of Medicine, has written what he calls a "psychohistory." It is the first book-length psychological review of UFOs by a psychiatrist since C. G. Jung published his book *Flying Saucers: A Modern Myth of Things Seen in the Sky* (1958). Billig's book has a number of

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strong points. In his second chapter the author reviews a case of three women who claim that they were abducted by creatures from another world. Dr. Billig was able to interview two of the women at length, and the text of the interview is contained in a 40-page appendix. What is important, aside from the author's noncredulous examination of the case, is the analysis of the mental conditions of the alleged abductees. The author is careful not to make sweeping assessments of these women but rather paints a relatively clear picture of each woman's emotional state both before and after the accident. The author does not judge the women, stating that it is "an idle issue to question the sincerity of the contactees, as the issue is not the honesty of the contactees, but their honest misperceptions. The central issue concerns the existence of transient conditions that allow complex misinterpretations, distortions, and fantasies that simulate actual events and that are erroneously substantiated as facts" (pp. 109-10).

The author tackles the difficult problem of why scientists, pilots, writers, and others have become sincere proponents of UFOs. With considerable perception Billig writes that most believers in UFOs fail to take into account the "emotional factors that may distort visual perception" of a witness or contactee (p. 108). Billig is not impressed by the use of hypnosis or polygraph tests. He points out that proponents use these methods "without being familiar with the limitations of the procedures" (p. 109). He concludes that the motivations of UFO proponents "may be based on the same needs that affect the contactee, as both have to cope with the same crisis-related anxieties that plague their society. Their sophistication prevents them from experiencing the 'encounters of the third kind' themselves, but does not hinder them from becoming an active backer of those who do" (p. 106).

Despite the author's grasp of the UFO phenomenon, the book does have some drawbacks. At the heart of the book's theme is the "crisis-related anxieties" of society that Billig feels help produce belief in flying saucers. It is this theme that noticeably complicates the book, and in attempting to support this theory the author becomes tedious. To develop the theme he tries to cover the entire history of flying saucers, starting with Ezekiel's sighting around 592 B.C. Inevitably, detail suffers in such a broad sweep, and in at least one instance the author confuses the Mexica Indians with the Mayans, both of Central America. I do not feel that the book proves the theme of a link between societal anxiety and UFOs. The idea that individual crisis or stress can have considerable effect on a person's view of events, however, is well documented.

Flying Saucers: Magic in the Skies is not light reading, nor is it for the person who has a casual interest in UFOs. For the student of flying saucers Billig's book represents a positive addition to the few skeptical works on the topic. Billig feels that there exists a major societal problem with flying saucers. As he states it, the "potential dangerous implications lie not in the sightings but in the assumption that debatable interpretations become indisputable facts" (p. 163). As for UFOs themselves, Billig concludes that "we cannot discard the probability that magic thinking creates the flying saucers in the minds of men" (p. 159). ●

Some Recent Books

Cohen, Daniel. *Waiting for the Apocalypse.* Prometheus Books, 700 E. Amherst St., Buffalo, NY 14215, 1983, 262 pp., $9.95, paper. Entertaining examination of the prophets of imminent doom active throughout history and scientific ideas about world-demolishing catastrophe. Timely in light of rising apocalyptic writings as the year 2000 approaches, subject of the final chapter. Revised and updated version of the author's 1973 book *How the World Will End.*

Committee on Science and Creationism. *Science and Creationism: A View From the National Academy of Sciences.* National Academy Press, 2101 Constitution Ave. NW, Washington, D.C. 20418, 1984, 28 pp., $4.00 (10 or more $1.75 each). Clear, strong, much-needed booklet from a distinguished scientific body, published in attractive format for wide dissemination, on the science vs. creationism issue. Has brief sections on the nature of science, scientific evidence on the origins of the universe and the earth, the scientific standing of biological evolution, human evolution, and the origin of life. Includes several forthright summaries, e.g.: "The Academy states unequivocally that the tenets of 'creation science' are not supported by scientific evidence, that creationism has no place in a *science* curriculum at any level, [and] that its proposed teaching would be impossible in any constructive sense for well-informed and conscientious science teachers. . . ."

Hall, Trevor H. *The Enigma of Daniel Home: Medium or Fraud?* Prometheus Books, Buffalo, N.Y., 1984, 148 pp., $16.95. Britain's most famous spiritualist is examined by an English writer and historian. Each chapter tries to solve some puzzle connected with Home previously not explained to the author's satisfaction. Most interesting and important is the chapter on Home's famous supposed "levitation" in December 1868. Hall's analysis calls into question the testimony of the prominent "eye witnesses" (it was done in the dark and they were instructed not to leave their places), citing eight serious discrepancies and contradictions. Home, a master at such things, had conditioned his friends psychologically into a high state of suggestibility: "The observers seem to have been reduced to a state where they were ready to believe anything Home suggested." Several plausible explanations are cited and put forth for what Home actually *did* do that night.

Van Leen, W. A. *O Is for Orange.* CCG. P.O. Box 6, North Perth, Australia 6006, 1984, 354 pp., SA10. Detailed examination of the members of the Rajneesh religion, also known as the Orange People—history, claims, beliefs, and practices.

—Kendrick Frazier

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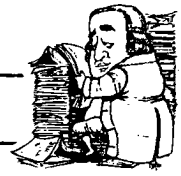

"And a Child Shall Lead Them—Astray." *Discover,* May 1984, p. 10. Brief Skeptical Eye column on the Tina Resch "poltergeist" case, including photos of the teenager deliberately knocking a lamp over when she thought the camera was not operating.

Budiansky, Stephen. "Anatomy of a Pressure Group." *Nature,* 304:301-02, May 24, 1984. Concerned report on the tactics and activities of Jeremy Rifkin and his crusade against genetic-engineering research. Rifkin has somehow managed to put himself across (to some anyway) as a Nader-like crusader for the public interest; he is probably the first pseudoscientist to operate in this area of science and quite this way.

Campbell, Steuart. "The Surgeon's Monster Hoax." *British Journal of Photography,* April 20, 1984, pp. 402-06. Analyzes the famous 1934 photo by Dr. Robert Wilson of a large object in Loch Ness usually considered the best picture of the Loch Ness monster. Determines that Wilson was not honest about where he stood when he took the photo—in an apparent deliberate attempt to leave the impression that he had photographed a large object—and that the object must be only 0.7 meter high, "a rather small monster." The size and shape of the object is consistent with an otter. Campbell concludes that "Wilson photographed nothing more extraordinary than an otter at play. However, he concealed this fact, and by lying about the height at which he stood above the water, allowed others to conclude that he had seen the 'monster.' "

Chefas, Jeremy. "The Difficulties of Darwinism." *New Scientist,* May 17, 1984, pp. 28-30. Report on lectures by Stephen Jay Gould describing four deep-seated biases in Western thinking that have kept us from appreciating and understanding what modern Darwinian evolutionary theory is really about.

Cross, Michael. "Fringe Science Speaks, and Scientists Listen." *New Scientist,* May 31, 1984, p. 12. Report on AAAS "Edges of Science" symposium.

deMille, Richard. "Occultism Is Not Science: A Reply to Kootte." *Journal of Mind and Behavior,* 5(2), Spring 1984. Replies to an earlier paper by A. F. Kootte (5:99-108, 1984) that contended that critics of Carlos Castaneda, and

particularly deMille, had failed to prove a hoax. DeMille reviews the three kinds of evidence indicating Castaneda's accounts are fiction—textual inconsistency, contradiction of independent knowledge, and examples of apparent ethnographic plagiarism. He criticizes Kootte for arguing "selectively, tendentiously, and unscientifically." Says deMille: "A cornerstone of Kootte's speciousness is his unscientific placing of the burden of proof on the community of scientists rather than on Castaneda, who made extraordinary claims for which he offered no proof whatsoever. . . ."

Donnelly, F. K., "Pseudo-science and the Librarian." *Canadian Library Journal,* April 1984, pp. 81-83. Examines the imbalance in libraries of pseudoscientific books critiquing the claims. Provides a guide to quality books and one periodical (guess which?) that "present critical perspectives." Ends with a list of 40 books on pseudoscience and expresses hope that libraries will obtain as many as possible.

"A Fantasy In Fairfield." *Discover,* July 1984, p. 12. Skeptical Eye column about the training in levitating and meditating at Maharishi International University in Iowa. The much-heralded "Maharishi Technology of the Unified Field," points out *Discover,* "is shamelessly borrowed from science, but has nothing to do with science." It concludes, "All the nonsense being practiced in Fairfield is not really hurting anyone except the students—who will be unprepared to function in a rational community—and the taxpayers." (The U.S. Department of Education has supplied almost a million dollars in student grants and loans to students here.)

Glymour, Clark, and Douglas Stalker. "Engineers, Cranks, Physicians, Magicians." *New England Journal of Medicine,* 308:960-64, April 21, 1983. Critique/commentary by two philosophers concerning "holistic medicine" ("a pabulum of common sense and nonsense" whose advocates too often "share an attachment to magic and an animosity toward reason") and other alternative therapies.

Honig, William M. "Science's Miss Lonelyhearts." *The Sciences* (N.Y. Academy of Sciences), May-June 1984, pp. 24-27. Fascinating and illuminating article about the author's eye-opening experiences as founding editor of *Speculations in Science and Technology,* a journal that set out to publish unproved but potentially useful ideas in science. The journal received scores of papers from the crackpot fringe. There were some diamonds from the "independents," but they were mostly buried "in a load of dross." Their presentation "was chaotic." Constructive criticism brought "undisguised anger" and an "unending stream of abuse." Honig observes poignantly: "If there was a single factor underlying all the failings of our authors, it was probably their isolation from colleagues with whom to discuss ideas. Many of their papers, it seemed to me, were not so much expositions on scientific matters as appeals for human contact." (This same issue of *The Sciences* contains a column by Louis Lasagna about CSICOP and the SKEPTICAL INQUIRER.)

Howgate, Michael, and Alan Lewis. "The Case of Miocene Man." *New Scientist,* March 29, 1984, pp. 44-45. Amusing report on effort of a British creationist group to claim that the British Museum (Natural History) had been covering up evidence of a 25-million-year-old modern-looking human skeleton—Miocene Man. In fact, the skeleton had been on public display at the

museum for many years between 1882 and 1967 and apparently it is of post-Columbian rather than pre-Pliocene age. The head of the creationist group was forced to concede that no one but he believed in its Miocene age, adding, "Of course I don't believe in the Miocene anyway."

Jukes, Thomas H. "The Creationist Challenge to Science." *Nature,* 308:398-400, March 29, 1984. Reviews in some detail the creationist threat. Considers it a serious battle between creationists and science. "It is not a polite discussion of differences in philosophy" (as some commentators in Europe have assumed). Recounts creationist efforts to censor textbooks and harass writers on evolution.

Kaiser, Peter K. "Nonvisual Color Perception: A Critical Review." *Color Research and Application,* 8 (3), Fall 1983, pp. 137-144. Critical review of the claim that some people can discriminate color with their fingers. Finds that research on the subject often has serious flaws, including not distinguishing between cues from texture and failure to adequately blindfold observers and prevent use of visual information.

Kurtz, Paul. "Extrasensory Perception." *Science* (letter), 224:239, April 20, 1984. Responding to a claim in letters column by Christopher Dodge (Feb. 3) that psi has long been around and already been applied for practical purposes, CSICOP Chairman Kurtz points out that there have been no clear laboratory demonstrations that extrasensory perception exists let alone that it has been applied. See also the letter "Parapsychology" (223:1014, March 9, 1984) by psychologists Vernon R. Padgett and Steven Cody. They state that the world is still waiting for a replicable demonstration of "psi" and ask Dodge, "In what forms has it been around, and where has it been applied?"

Kurtz, Paul, and Andrea Szalanski. " 'Psychic Detectives.' " *Miami Herald,* April 29, 1984, p. 1E. (Syndicated by Knight News Service.) Article written for *Herald's* Viewpoint section details public and media misconceptions about claims of so-called psychic detectives and recounts notable failures, few of which are ever reported. Calls on "psychic detectives" to produce scientifically verifiable results or quit claiming paranormal powers. Urges the media to be more cautious and skeptical in reporting claims and to follow them up and report failures as well as self-proclaimed successes.

Maddox, John. "No Patience for the Paranormal." *Nature* 308:311, March 22, 1984. Excellent commentary on science and the paranormal by the editor of *Nature.* In response to pro-paranormal writers like Brian Inglis who reproach contemporary science for supposedly ignoring the paranormal, Maddox points out that such pleas were heeded by serious scientists beginning a century ago, but to no effect. The onus, says *Nature,* is now on the unorthodox. "There was a time almost within living memory when academic people paid close attention to claims that paranormal phenomena occur, and were discovered to have wasted their time unmasking fraud. . . . The record of charlatanism has continued ever since." Maddox finds it mystifying that people like Inglis "should still insist that 'orthodox' science blindly refuses to enter a whole field of science which is supposedly ripe for investigation but which is never defined with any clarity."

Oberg, James. "UFO Update." *Omni,* May 1984, p. 93. Brief column criticizing pro-UFO researchers like J. Allen Hynek for failing to come to grips with

the reality of human deception, the foibles of perception, and the unreliability of eyewitnesses. Argues Oberg: "We can account for decades of UFO sightings without resorting to extraordinary explanations."

Plummer, Mark. "Psychic Fraud." *Australian Penthouse.* May 1984, pp. 34-40 and 160. Covers the work of the Australian section of CSICOP—the Australian Skeptics—in exposing psychic fraud in Australia. Covers psychic surgery, visits of overseas psychics to Australia, water dowsing, clairvoyants, psychic crime-detection, and Transcendental Meditation. Examines tests done by the Australian Skeptics and the response to patron Dick Smith's offer of $100,000 to the first person to prove he or she has paranormal powers.

Skrabranek, Petr. "Acupuncture and the Age of Unreason." *Lancet,* May 26, 1984, pp. 1169-71. Strong critique of acupuncture, based on the author's study of the medical literature pro and con. Asserts that numerous controlled studies have shown the claims for acupuncture have no scientific validity. Points to three previous resurgences of acupuncture in the West in the past 300 years, each time rejected for want of evidence. Disputes the claim that it has anything to do with endogenous opioids. Cites many examples of "acupuncture fantasy." States that although acupuncture may have therapeutic value as a placebo and that the placebo itself is valuable, a "spade should be called a spade." Notes that Chinese medicine rejected acupuncture in the early nineteenth century. Argues that its reintroduction by Maoists "was a political device to provide cheap medical care for millions in newly 'liberated' areas." As for another frequently heard argument, says the author, "Neither does it follow that because acupuncture has been used for 5,000 years there must be 'something to it.' Just think about astrology."

Suzuki, David. "Science Communication—Too Little Signal, Too Much Noise." *Science Dimension* (National Research Council of Canada), 16, no. 2, 1984, p. 30. Excellent essay about the widespread ignorance and superstition about science, technology, and medicine while the world is *awash* in information. "The problem is that there is an enormous amount of 'noise' in this information, by which I mean 'junk' or 'garbage.' " Science teaches its practitioners to sift out "the insignificant, irrelevant, or incorrect," but the general public is not so trained. "To me . . . the great strength of scientific activity [is that] we demand *evidence* and *we* evaluate it. And that attitude is the most important gift we in science can provide to the general public."

Timson, John. "Rise and Fall in Mesmerism." *New Scientist,* May 24, 1984, p. 31. Brief piece pegged to 250th anniversary of the birth of Franz Anton Mesmer. Mesmer developed a therapeutic treatment based on his belief in a magnetic force, "animal magnetism," which he tried to project into his patients. He claimed all sorts of miraculous cures (to the disgust of his medical colleagues), and the mesmerism movement became a popular fad.

Tyson, G. A. "An Empirical Test of the Astrological Theory of Personality." *Personality and Individual Differences,* 5, no. 2, pp. 247-50, 1984. Psychologist investigated accuracy of genethliacal horoscopes by asking subjects and family members to try to identify which one of five cast horoscopes was based on his/her birth data. Each subject also completed a personality questionnaire and was also rated on five personality dimensions by the horoscope-casting astrologer, the subject, and the subject's nominee. Of 15

subjects only two correctly identified their horoscopes. Other parts of test were likewise unsupportive of astrology. "The results indicate clearly that the astrologer was unable to provide any valid information regarding the personalities of the subjects. The fact that both the subjects and the nominees were unable to identify the subject's horoscope suggests that the horoscopes were neither accurate nor specific to the individuals."

Waldrop, M. Mitchell. "Astrology's Off Target." *Science 84*, June 1984, p. 80. Brief piece about studies demonstrating invalidity of astrology.

Weisskopf, Michael. "China Presses Drive to Exorcise Sorcerers, Wizards." *Washington Post*, March 30, 1984, p. A20. Interesting Peking-datelined article on the efforts of Chinese leaders to combat a resurgence of superstition and supernatural beliefs among millions of Chinese peasants. Recounts many stories of harm and even death caused by superstitious practices. Examples are a man who drowned himself, his wife, and his five children on the advice of a self-proclaimed sorcerer who promised them all immortality. A mother persuaded by a "divine examiner" that a harmful "rabbit spirit" lived inside her daughter's stomach watched a shaman slit open the girl's throat and abdomen, killing her. Such superstitious beliefs are now running rampant in China.

—*Kendrick Frazier*

From Our Readers

A psychic military defense? A dangerous delusion

When I was first hired by the Council for a Livable World (founded in 1962 by the eminent nuclear physicist, Leo Szilard) to distribute contributions to U.S. Senate candidates who support nuclear arms control, I was warned by my predecessor that "some people in the peace movement can be *very* weird."

At every turn since I became assistant executive director and began to deal directly with our supporters, I have had occasion to remember this caution. After all, if it is disturbing for the most rational person to ponder nuclear holocaust for even a short period, just consider what can happen to someone slightly over the edge emotionally who visualizes the end of the world to the exclusion of almost any other activity.

But among the religious, paranoid, quirky, and just plain crazy people haunting any peace group are a few off-the-wall idea-pushers who must be taken more seriously. For instance, we were harassed for several months last year by someone from the high-tech field who possessed the blueprint for a new technology so secret and so bizarre and so "desperately important for the peace movement to get before the military corrupts it," that I still don't want to talk much about the episode until I feel sure that the man really *was* a nut, the idea impossible, and the military uninterested.

Happily, the passage of two years has erased from my memory the name of the retired U.S. Army general who telephoned me several times to insist that we do something about the Soviet use of ESP. "Happily," because I can think about the calls without the hair rising at the back of my spine, and can write about them without worrying that I'll be in trouble with either the Department of Defense or some mad scientist messing around with the earth's atmosphere using a technique that, if genuinely applicable, could have consequences approximate to the ones accompanying the splitting of the atom.

At the time of the general's urgent calls I did my best to ignore his message, while making reassuring noises that, if it were proved to us that the Soviets really were concentrating psychic bad wishes at the U.S., the Council would of course include verifiable prohibitions against such scurrilous behavior in its requirements for a thorough arms control treaty.

Had I known this wasn't simply another unhinged contributor, I might have looked into U.S. military experiments into psychic defense earlier and laughed less heartily. The press may poke fun at recent revelations that our defenders are playing with the occult—and I hope the poking continues—but the legitimation of the paranormal caused by this research has to bother anyone devoted to debunking the mythologies enveloping U.S.-U.S.S.R. relations and to demystifying the Orwellian language of our military technocrats. (I must add here that I see a strange coincidence in NOVA's "The Case of ESP"

[*SI*, Summer 1984] and the immediate [i.e., *next day*] media followup of SRI International people touting potential military uses of psi phenomena. I imagine the SRI types of this world must be eagerly anticipating their chance to dive into the bottomless well of Pentagon expenditure—and as a media relations exercise the NOVA/SRI combo took some beating.)

Now, sometimes I do become as nervous as those poor souls constantly envisaging the last millisecond of a world in the paroxysms of all-out nuclear war. My mind then turns to the absurd—when it can't in conscience turn away completely.

On the latest front this has led to two ideas for disarming the Soviets. The first is that, if skepticism tends to disrupt psychic forces, then U.S. citizens have only to focus their disbelief on the U.S.S.R. and the Red mental peril will dissolve in the same puff of smoke as all other psi experiments under similar stress.

The second idea is that, if we were to choose an exact hour GMT to focus the wrath of America against the U.S.S.R., then our enemy's entire *country* could be wiped out! Unfortunately, it has been pointed out to me that the main objection to this latter solution to our superpower headaches is that it would take only "one bed-wetting, commie pinko, etc., etc.," deliberately doubting on behalf of the Soviet Union to wreck the enterprise.

When I run out of giggles and ridiculous scenarios and start wanting to throw in the towel, I bank on a hope that those of us who are not entirely mad will question any serious study of the paranormal by our military, in case, for example, it again (unsuccessfully) uses psychics to track Soviet submarines and genuinely endangers us all by a faith in the occult that could well be characterized as sinister.

On the other hand, a scientist friend of mine said to me the day after that abominable NOVA program: "Just think what would happen if they actually *did* replicate an ESP experiment!" In other words, the danger of the use of any controllable psychic forces would be as profound as the danger resulting from the neglect of our defenses if we were ever idiotic enough to depend on unproved paranormal powers to foresee Soviet nuclear weapons deployments, or to warp the flightpaths of incoming ICBMs. I hate to say this, but at least nuclear weapons are *real* and the deterrent they pose is a matter of historical *fact*.

As with any campaign for nuclear arms control, the obligation of the sane is to prevent the current situation from moving past the mildly funny to the overwhelmingly tragic. I believe that allowing the military in any way to foster public acceptance of the paranormal—if only because it adds an irrational element to the public's already crippling fear of the U.S.S.R.—is dangerous enough to warrant stopping the use of tax dollars for any such experimentation *at all*. I hope, therefore, to see campaigns against the waste of money and the potential defense gaps created by the Pentagon's outrageous plans to investigate the military uses of the paranormal.

Catherine Clark
Melrose, Mass.

Let's all concentrate

An acquaintance of mine, a person of impeccable intellectual credentials, told me that he had read, or maybe heard, "somewhere" about some evidence that people were demonstrating telekinetic powers. He described the experiment as being unfixable. The subject of the experiment would sit near a box containing a radioactive material, whose emissions are of course governed by known, invariable probabilistic distributions. A counter is placed outside a hole in the lead box surrounding the material. The subjects were alleged to be able to alter the rate of emissions

from the radioactive material.

Now if this is true, it will prove a great boon to America's defense efforts. Who needs ABM systems or expensive laser satellites when we need only train teams of parapsychs to stand vigilant guard over our land to keep nuclear weapons from detonating? The prospects are exciting, but we must begin development soon, for it is well known that the Russians spend a lot of money on psi research. Even now they are probably training a corps of Slavic psychics to make Russia safe from our retaliation.

Because of the benighted, unenlightened establishment in our country, I may not be able to enlist sufficient support from our government to get our program going. I therefore would like to solicit aid from the members of CSICOP. The shyness effect of psi powers is well known and amply documented. It has further been documented by your journal that this effect can be exerted over any distance and is acausal, since psychic phenomena can be disrupted even after the fact by skeptics reading about the event. If every reader of *SI* will concentrate on disbelieving the Russians' ability to generate a viable psychic defense, we may just be able to wipe out their PSIBM capability. OK now: one, two, three.

Timothy L. Gunn
Glen Burnie, Md.

Refutations, weak and strong

I found T. Pasquarello's article on the fallacies of proving negatives (*SI*, Spring 1984) interesting. He clearly demonstrated that the real problem is in the ambiguity of the domain and the definiteness of terminology. I would like to emphasize two related points.

First, he says specific explanations of UFO sightings are only weak refutations of the UFO "hypothesis." If the hypothesis is an unsupported claim, it suffers from the same domain-freedom as most theological questions. But what of the anecdotal evidence? Surely that makes the claim verifiable. Only if the proponents state what the irrefutable evidence is. Otherwise, after each claim is demolished another anecdote appears and the situation is indistinguishable from an unsupported hypothesis. To call this weak refutation is misleading; it is strong refutation of a weak hypothesis.

Second, the "negative" assertion is often much more than that. Creationism is not the opposite of evolution. If it were, as he points out, all confirming evidence for evolution would become (weak) refutation for creationism. However, creationists, usually implicitly, embrace a spiritual aspect that these refutations do not address. Evolutionists often fall into the trap of abandoning their evidence to refute the spiritual claims.

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UFOlogy exhibit

Regarding "intellectual bankruptcy of UFOlogy" mentioned in Michael R. Dennett's report (*SI*, Spring 1984), I wish to reply. In separate correspondence, he has made suggestions for improvements we were planning to make in the CUFOS photo exhibit, as funds become available. However, it is unfortunate for the truly curious minds among us that some very capable people, such as Mr. Dennett and others, devote such an inordinate amount of their time and talent to public attack on a few controversial UFO sighting reports and so little time on the truly challenging cases, many of which were on photographic display.

The net effect of insulting phrases used to describe those who are seeking answers to the UFO phenomenon is a

further reduction of the likelihood of enlarging the intellectual reservoir from which those answers may emerge. We tend, thereby, to "throw out the baby with the bath water" by leaving the search for answers to those least likely to recognize them. If stifling intelligent interest in this search is the goal, it is being effectively accomplished by such slurs being given wide circulation in such publications as the SKEPTICAL INQUIRER.

On the other hand, the rational, discerning comments of Professor Paul Kurtz in the same Spring 1984 issue encourage the important distinction "between the open mind and the open sink." He wisely warns us that, "when confronted with Isaac Asimov's 'exoheresies' (deviations made outside of science by those who do not use objective methods of inquiry and whose theories cannot be submitted to test, replication, validation or corroboration), we must be extremely cautious because a protoscience may be emerging that deserves careful appraisal by the scientific and intellectual community."

John P. Timmerman
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About Loch Ness

The review by Payne (*SI*, Winter 1983-84) of Binns's book about Loch Ness stressed the book's good points and ventured only one caveat, Binns's reliance on negative evidence. The book has worse failings than that, however. There are many errors and misleading statements that unfortunately will be evident only to those who are already familiar with the literature about Loch Ness. Discernible to any critical reader, however, is the loaded language used by Binns in lieu of substantive argumentation and as a means of discrediting many people.

Here I give only a few examples. Binns claims (pp. 109, 122) that the Royal Air Force report on Dinsdale's film says nothing to contradict the notion that a motorboat was filmed or to support the belief that the film captured an animal in motion; yet that report characterizes the film as showing "probably an animate object," and Binns himself in another place (p. 117) demolishes Maurice Burton's suggestion that Dinsdale had filmed a boat. Then again, Binns says (p. 64) that Constance Whyte never lived "at Loch Ness"—Whyte being the author of *More Than a Legend* (Hamish Hamilton, 1957), which is plausibly credited for stimulating the expeditions of 1960 and later years; but Whyte did live for two decades at Clachnaharry, two miles from Inverness" (Whyte p. xviii), that is, within ten miles of the northern end of Loch Ness and quite close enough to support Whyte's statements that her interest was first aroused by the testimony of eyewitnesses whom she knew personally.

Connoisseurs of innuendo should note Binns's use of such expressions as "significantly" and his application of quotation marks to such terms as *investigation*. Critical readers will ask themselves how Binns could know in such intimate detail the emotions of the people he denigrates as "on the brink of nervous exhaustion," "increasingly obsessed," "tossing restlessly in his sleep," "shaking with excitement"—all these and more purportedly describing events 25 years in the past, without benefit of a written record except statements by the principals, who of course tell a quite different story. And anyone might wonder why Binns would posthumously denigrate Rupert Gould as a "Falstaffian eccentric" who "died in obscurity"—a curious obscurity, since Gould was regularly heard on the BBC almost to the day of his death, and at least four of his books have been reprinted since then.

One who seeks to be well informed about Loch Ness cannot rely only on Binns. The most comprehensive discus-

sion of the scientific data (films, photos, sonar) is in *The Monsters of Loch Ness* by Roy P. Mackal; the most readable (and very reliable) account is *The Loch Ness Story* by Nicholas Witchell. I have published an annotated bibliography of the score of books and other significant references (*Zetetic Scholar*, no. 7, December 1980, 30-42, and no. 10, December 1982, 26).

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Null hypothesis on Nessie?

In his article "Proving Negatives and the Paranormal" (*SI*, Spring 1984) Tony Pasquarello refers to the Loch Ness monster (as a phenomenon whose existence skeptics may deny). However, it is a pity that he is not familiar with the lake.

Craig's log hypothesis (which he lauded) was flawed from the start because Loch Ness is *not* surrounded by Scots pine trees! The Scots pine survives in only isolated clusters and lone trees, and the most common tree (apart from plantation spruce) is birch. Moreover, Craig's hypothesis is considered to be unsound; it is definitely unproved. Underwater cameras have failed to find any rotting vegetation or tree trunks.

I also question a claim that Mackal's *The Monsters of Loch Ness* is "the definitive work"; the definitive work has not yet been written and it could hardly be written by a believer.

Pasquarello claims that the creature is "a quite possible one." On the contrary, as described by believers (a left-over plesiosaur) it is impossible; the water is too cold for reptiles, the creatures would be seen breathing at the surface, and plesiosaurs could not dive! The descriptions of the monster fit no known species. Consequently the null hypothesis is more than academic in this case.

Steuart Campbell
Edinburgh, Scotland

Science and pseudoscience

When I received my first issue of the SKEPTICAL INQUIRER, I found it both fascinating and refreshing, probably because it reflected my own way of thinking. Now, and after having renewed my subscription, I am beginning to find it rather boring with its everlasting litany of hoaxes, exposed quacks, and the like.

I am beginning to think that all the time and efforts involved in such investigations would be better spent in equally energetic efforts for the advancement of science. After all, there have always been magicians, dowsers, haunted houses, etc., and they have never been a hindrance to scientific progress. You do not advance science by exposing pseudoscience, which is a negative activity with no return, but by generating new knowledge that will enrich science; in other words, the advancement of science is more cost-effective than the refutation of pseudoscience. It is a waste of time to try to disprove claims that the pseudoscientists do not take the trouble to prove. A lot of hoaxes and unfounded beliefs have been defused in the past and will be in the future simply because some new scientific discovery makes them untenable.

To me, the main difference between science and pseudoscience is that science works on models that have a definite field of validity and are continually confronted with reality and as a result are improved, whereas pseudoscience does not propose any model at all or proposes models based on unfounded extrapolations of scientific models, i.e., applications of scientific models outside their field of validity. The constant reference to quantum mechanics in relation to parapsychology is one case in

point. This is not brought out with sufficient clarity in the two general articles by Kurtz and Pasquarello in your Spring 1984 issue. But for me it is enough to justify my interest in science and my rejection of the whole of the pseudoscientific junk almost a priori.

It is not surprising that any constructive dialogue between the scientists and the pseudoscientists is almost impossible. In science, an observation becomes a fact only with respect to some reference framework or system of thought. The scientists and pseudoscientists do not have the same reference framework and therefore cannot communicate.

P. Naslin
Brussels, Belgium

Most people involved with CSICOP and the SKEPTICAL INQUIRER *do devote the* bulk *of their time, in one way or another, to the advancement of science. Misconceptions, misperceptions, and misinformation are impediments to that advancement, however, and we are committed to the idea that some effort by scientists and other informed investigators must be devoted to this form of public education. Also, while there are many publications devoted to revealing dramatic new discoveries about nature—and we read them enthusiastically, write for them, and heartily recommend them to everyone—the* SKEPTICAL INQUIRER *is the* only *international publication devoted to critiques of paranormal and fringe-science claims. We feel this is an essential complementary role.*—The Editor.

Creationism a U.S. invention

While reading "The State of Belief in the Paranormal Worldwide" (*SI*, Spring 1984) I noticed that the authors said very little about creationism. Mario Mendez-Acosta and Dick Smith mentioned it, but only to say it was not very important in their countries. This is not surprising. "Scientific creationism" is an American invention. It is derived from fundamentalism, itself a product of the U.S. religious scene. When "scientific creationists" are found in foreign countries, they usually have strong American ties.

This narrow national background is by itself a serious obstacle to the creationist claim to scientific respectability. One of the hallmarks of science is its international character. Unlike creationism, science is practiced all over the world. No true science is centered almost exclusively in one country. This is one more reason why creationism cannot be considered a science.

Glenn T. McDavid
Chicago, Ill.

Less cause for gloom in U.K.

I was pleased to see your report on the paranormal worldwide in the Spring 1984 issue, for it is essential we all recognize this field of research as a global one. Michael Hutchinson's observations on the British scene gave a clear picture but were in one respect more gloomy than is, I suggest, warranted.

He refers to "a magazine that started in late 1980 and ended, as planned . . . after publishing over 120 issues." This was of course the Orbis partwork *The Unexplained* and, insofar as it was—to the publisher's surprise—a tremendous success, it does bear out Hutchinson's "tremendous upsurge of interest." But what kind of interest? In 1981 the editor asked me to look into the 1979 UFO sightings in West Wales, with an eye to a three-article re-evaluation. I went down to Wales and quickly discovered that this amazing flap, which had resulted in three full-length books, was almost wholly made up of misinterpretation, exaggeration, uncritical reporting, and downright lying. When I sent in my articles, I sug-

gested to the editor that he might not feel happy about printing so negative a series: on the contrary, he was delighted, for this kind of objective approach was just what he wanted.

Seemingly it was just what his readers wanted, too, for having originally planned for 120 issues, *The Unexplained* ultimately stretched to 156. During that time I wrote several further articles, sometimes debunking—as in the case of the Barney and Betty Hill case—sometimes more positive, as in the case of the ongoing phenomena in Hessdalen, Norway.

The moral is surely self-evident: there *is* a public that does not want to be fooled, and is prepared to adopt a critical approach. But it will not stand to have its intelligence insulted either by exaggerated credulity or by exaggerated skepticism. This is further borne out by the success of the "Evidence" series of paperbacks produced by our Association in conjunction with Aquarian Press: in this series, of which four have already been published, with six more titles in the pipeline, we attempt to present the current "state of the art" in various fields of anomaly research, giving readers the evidence—or indicating the lack of it—in a way that leaves them free to use their own judgment and form their own opinions.

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Christmas-tree caper

A demonstration of the unreliability of eyewitness testimony occurred in April 1984 while I was conducting a cultural resources survey involving shovel tests of soil near Ellington, New York.

My crew was working along a route for a gas pipeline, digging shallow holes every 100 feet, and in the process, passed through a small Christmas-tree farm. Shortly thereafter we were confronted by the New York State Police. A neighbor of the tree-farm owner had reported us for Christmas-tree theft! According to the police, the "eyewitness" had observed five men with shovels digging up the trees, shaking dirt out of the roots, and placing the trees in the trunk of a car. The only accuracies in the eyewitness report were men with shovels and the license number of one of our vehicles. The rest was supplied by imagination.

It seems that there had been thefts of trees in the past, and the absentee owner asked the eyewitness neighbor to keep an eye out. The observation of men with shovels, and—later—seeing holes in the ground that had been filled in, led the woman to the only conclusion available: theft of trees. All else was logically, but incorrectly, supplied by her imagination. How many paranormal reports of UFOs, etc., are similarly recorded by eyewitnesses? Probably a lot. What is amusing is that the Christmas-tree farm owner turned out to be a friend of Paul Kurtz!

Charles J. Cazeau
E. Amherst, N.Y.

Unicorn III

I enjoyed the Unicorn I and II reports (*SI*, Spring 1984)—there was nothing on them in my local paper—and wish to remind *SI* readers that the beasts do exist—albeit in a form somewhat different from that shown in the usual illustrations one sees these days.

According to Pliny the Elder, the beast ". . . has a stag's head, an elephant's feet, and boar's tail. The rest of the body is like a horse. It makes a deep lowing noise, and one black horn two cubits long projects from the middle of the forehead. This animal, they say, cannot be taken alive." Pliny's monoceros is, of course, the Indian rhinoceros.

It is also worth noting that both Pliny and Aelian (as well as later

observers) spoke of "unicorned cattle" in Africa. They clearly weren't rhinos, but what they were and how they came to be wasn't solved until 1933, when a University of Maine biologist, Dr. W. Franklin Dove, operated on a day-old male Ayrshire calf. Dove implanted trimmed horn buds in the calf's forehead, where, in time, they emerged as a single horn. A drawing, based on a photograph of Dr. Dove's bull, is in Chapter 1 of *Willy Ley's Exotic Zoology* (Viking Press, 1959), from which come the details I've recounted above.

George W. Earley
Bloomfield, Conn.

Propositions and impossibilities

In "Debunking, Neutrality, and Skepticism in Science" (*SI*, Spring 1984) Paul Kurtz speaks of some skeptics "maintaining that, since paranormal concepts contradict the basic conceptual categories by which we understand and interpret the world, they may be rejected on a priori grounds. In my view, it is difficult to impose preconceived limits to inquiry or to rule out such claims as logically 'impossible.' "

This statement does not do justice to the skeptical case at its strongest. For the only putative psi phenomenon that skeptical philosophers of parapsychology have ever argued would involve a conceptual impossibility is paranormal precognition. (The reason urged is that it is usual, implicitly or explicitly, to define this expression in terms of backwards causation; which would require either that something that had already happened is later made not to have happened and/or that something that had already occurred was only later made to have occurred.)

What I and others do however want to insist is that the remaining putative psi phenomena are all phenomena that we have very strong experiential reasons for believing to be impossible (not logically or conceptually but) empirically and as a matter of fact. After all, every contention that some law of nature obtains precisely is the claim that occurrences according with that law are as a matter of fact necessary while occurrences inconsistent with that law are as a matter of fact impossible. Of course, any such nomological contention may turn out to have been false. But, in so far as we do have massively good experiential and experimental reason for believing that some particular nomological (law of nature) proposition is true, then we do have correspondingly excellent reasons for dismissing stories of occurrences that must be, if that nomological is true, impossible.

Surely the only thing that could show us that we had been in error would be a repeatable demonstration that what we had thought impossible was not impossible because it does actually happen, repeatedly. (It has to be repeatable and repeated because any account of any supposed on-off demonstration is exposed to Hume's devastating argument about the contradictory character of evidence for the miraculous.)

Antony Flew
Reading, England

Texas campus group

I want to inform you of yet another local organization with aims similar to those of CSICOP. I sponsor USTOP (University Society To Oppose Pseudoscience), which is a student group here at the University of Texas at Austin.

Our group is intended to spread the word within the university community. We have monthly presentations that treat some area of pseudoscience in depth. (Our most recent meetings have dealt with creationism—quite an important topic in Texas—and monsters (Nessie, Bigfoot, etc., which did not generate much interest—perhaps due to

the fact that there have been no published reports concerning the Loch Austin monster).

We expect to cover the gamut of pseudoscience—including nutrition fads—in future meetings. But, typical of student organizations, we have difficulty attracting many people willing to commit time to matters that are not "hot" issues of the day. Nevertheless we have managed to hang together for over a year. And there is an indication that we will begin receiving more media attention than in the past. Both campus newspapers (the *Daily Texan* is the student paper and *On Campus* is published for faculty and staff) have indicated they want to do stories about USTOP. Another encouraging sign for the near future is that the newly elected editor of the *Daily Texan* is a science major, and he picked a pseudoscience topic (creationism) to attack in his campaign editorial.

In a related matter I think you should know that another Austin anti-pseudoscience group, A-STOP, has a new president. Replacing Charlotte Cranberg is Rory Coker, a professor in the Physics Department at UT. Rory offers an undergraduate course concerning pseudoscience that draws quite a good enrollment each spring semester.

Steve Bratteng
Lab Supervisor
Div. of Biological Sciences
University of Texas, Austin

Collapse of *Contra*

I am very sorry to say that *Contra*, my newspaper against superstition and pseudoscience, has been executed.

The fight against superstition and pseudoscience in the German area is not possible. None of the scientists or science writers has tried to or wanted to help. Not one of them is interested in this subject. This is very disappointing.

I did what I could.

Although there are many pseudoscientists who work together and are well organized, most of the well-known critical science-writers are working alone, not together. CSICOP, in this case, is an honorable exception.

Thank you very much for your support.

Walter Hain
Vienna, Austria

The Committee for the Scientific Investigation of Claims of the Paranormal

Paul Kurtz, Chairman

Scientific and Technical Consultants

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Local Organizations (groups with aims similar to CSICOP's)

Arizona: Tucson Skeptical Society (TUSKS), Ken Morse, 2508 E. 23rd St., Tucson, AZ 85713.

California: Bay Area Skeptics, Robert A. Steiner, Chairman, Box 659, El Cerrito, CA 94530.

Colorado: Colorado Organization for a Rational Alternative to Pseudoscience (CO-RAP), Béla Scheiber, Director, P.O. Box 7277, Boulder, CO 80306.

Minnesota Skeptics: Robert W. McCoy, 549 Turnpike Rd., Golden Valley 55416.

Northwest Skeptics: Michael R. Dennett, Chairman, Washington Coordinator, 4927 S.W. 324th Place, Federal Way, WA 98003; John Merrell, Oregon-Idaho Coordinator, 4885 S.W. 152nd Ave., Beaverton, OR 97007.

Pennsylvania: Paranormal Investigating Committee of Pittsburgh (PICP), Richard Busch, Chairman, 5841 Morrowfield Ave., #302, Pittsburgh 15217.

Texas: Austin Society to Oppose Pseudoscience (A-STOP), Charlotte M. Cranberg, President, P.O. Box 3446, Austin 78764. Dallas Society to Oppose Pseudoscience (D-STOP), James P. Smith, Science Div. of Brookhaven College, Dallas 75234. Houston Society to Oppose Pseudoscience (H-STOP), Steven D. Schafersman, Chairman, P.O. Box 541314, Houston 77254.

The Committee for the Scientific Investigation of Claims of the Paranormal

The Committee for the Scientific Investigation of Claims of the Paranormal attempts to encourage the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and to disseminate factual information about the results of such inquiries to the scientific community and the public. To carry out these objectives the Committee:

- Maintains a network of people interested in critically examining claims of the paranormal.
- Prepares bibliographies of published materials that carefully examine such claims.
- Encourages and commissions research by objective and impartial inquirers in areas where it is needed.
- Convenes conferences and meetings.
- Publishes articles, monographs, and books that examine claims of the paranormal.
- Does not reject claims on a priori grounds, antecedent to inquiry, but rather examines them objectively and carefully.

The Committee is a nonprofit scientific and educational organization. The SKEPTICAL INQUIRER is its official journal.